Alibaba Cloud
Elastic Compute Service

Instance

Issue: 20200518
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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>Bold</td>
<td>Bold formatting is used for buttons, menus, page names, and other UI elements.</td>
<td>Click OK.</td>
</tr>
<tr>
<td>Courier font</td>
<td>Courier font is used for commands.</td>
<td>Run the cd /d C:/window command to enter the Windows system folder.</td>
</tr>
<tr>
<td>Italic</td>
<td>Italic formatting is used for parameters and variables.</td>
<td>bae log list --instanceid Instance_ID</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>
</table>
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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.
## 2 ECS instance lifecycle

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 <strong>Running</strong> 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 by using the ECS console or by calling an API operation, the instance enters this state before it enters the <strong>Running</strong> 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 runs properly, it is in this state.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Note:**
An ECS instance can be accessed externally only when it is in the **Running** state.

<p>| Expiring    | Running                  | Stable          | A subscription instance remains in the <strong>Expiring</strong> 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 <strong>Renewal overview</strong>. | Yes                        |</p>
<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>Stopping</td>
<td>Stopping</td>
<td>Intermediat,e</td>
<td>After you stop an instance by using 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 is stopped or after it is created but has not started, it is in the Stopped state.</td>
<td>Yes</td>
</tr>
<tr>
<td>Expired</td>
<td>Stopped</td>
<td>Stable</td>
<td>After a subscription instance expires or a pay-as-you-go instance is stopped due to overdue payments, the instance enters the Expired state. For more information about resource status 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 operation to query the statuses of instances. The following figure shows transitions between the states in API responses.
3 Instance families

An ECS instance is the smallest unit that can provide compute capabilities and services for your business. This topic describes available ECS instance families and their features, specifications, and application scenarios.

ECS instances are categorized into different instance families based on their usage scenarios. 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, such as CPU, clock speed, and memory. In addition to the instance type, you must also configure the Block Storage devices, image, and network type when you create an ECS instance.

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

Enterprise scenarios have high requirements for business stability. Alibaba Cloud ECS instance families are divided into enterprise-grade and shared instance families based on whether the instance families are suitable for enterprise scenarios. Enterprise-grade instance families offer consistent performance and dedicated resources. Each vCPU in an enterprise-grade instance family corresponds to an Intel® Xeon® core hyperthread. For more information about the differences between enterprise-grade and shared instance families, see ECS instance FAQ.

You can upgrade or downgrade instances within the same instance family or across instance families. For more information, see Instance families that support instance type changes.

Alibaba Cloud ECS instances are categorized into the following instance families:
enterprise-grade computing instance families based on the x86 architecture:

- Recommended instance families
  - g6, general purpose instance family
  - g5, general purpose instance family
  - g5se, storage enhanced instance family
  - g5ne, network enhanced instance family
  - ic5, compute intensive instance family
  - c6, compute optimized instance family
  - c5, compute optimized instance family
  - r6, memory optimized instance family
  - re6, memory optimized instance family with enhanced performance
  - r5, memory optimized instance family
  - d2s, storage intensive big data instance family
  - d1ne, big data instance family with enhanced network performance
  - i2, instance family with local SSDs
  - i2g, instance family with local SSDs
  - i2ne, instance family with local SSDs
  - i2gne, 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

- Other available instance families
  - sn2ne, general purpose instance family with enhanced network performance
  - sn1ne, compute optimized instance family with enhanced network performance
  - 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
  - d1, big data instance family
  - i1, instance family with local SSDs
  - hfc5, compute optimized instance family with high clock speed
  - hfg5, general purpose instance family with high clock speed
• Enterprise-grade heterogeneous computing instance families:
  
  - **Recommended instance families**
    - vgn6i, lightweight compute optimized instance family with GPU capabilities
    - gn6i, compute optimized instance family with GPU capabilities
    - gn6e, compute optimized instance family with GPU capabilities
    - gn6v, compute optimized instance family with GPU capabilities
    - f3, compute optimized instance family with FPGAs
  
  - **Other available instance families**
    - vgn5i, lightweight 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 instance family with GPU capabilities
    - f1, compute optimized instance family with FPGAs
• ECS Bare Metal Instance families and Super Computing Cluster (SCC) instance families:
  - Recommended instance families
    ■ ebmgn6e, compute optimized ECS Bare Metal Instance family with GPU capabilities
    ■ ebmgn6v, compute optimized ECS Bare Metal Instance family with GPU capabilities
    ■ ebmgn6i, compute optimized ECS Bare Metal Instance family with GPU capabilities
    ■ ebmc6, compute optimized ECS Bare Metal Instance family
    ■ ebmg6, general purpose ECS Bare Metal Instance family
    ■ ebmr6, memory optimized ECS Bare Metal Instance family
    ■ ebmhf6c6, compute optimized ECS Bare Metal Instance family with high clock speed
    ■ ebmhf6g6, general purpose ECS Bare Metal Instance family with high clock speed
    ■ ebmhf6r6, memory optimized ECS Bare Metal Instance family with high clock speed
    ■ ebmhf6g5, ECS Bare Metal Instance family with high clock speed
    ■ ebmc4, compute optimized 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
  - Other available instance families
    ■ 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
    ■ ebmg5, general purpose ECS Bare Metal Instance family
• Shared computing instance families based on the x86 architecture:
  - t6, burstable instance family
  - t5, burstable instance family
  - v5, CPU overprovisioned instance family
  - s6, shared standard instance family
  - xn4, n4, mn4, and e4, previous-generation shared instance families
• Phased-out instance families:
  For more information, see Phased-out instance types.
Elastic Compute Service
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**g6, general purpose instance family**

**Features**

- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks.

**Note:**
The maximum performance of disks varies with instance families. A single g6 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see [g5se, storage optimized instance family with enhanced performance](#).

- Provides high storage I/O performance based on large computing capacity.
- Offers a CPU-to-memory ratio of 1:4.
- Allows you to enable or disable Hyper-Threading.
- Provides an ultra high packet forwarding rate.

**Note:**
The maximum network performance varies with instance families. For higher packet forwarding rate, we recommend that you use g5ne. For more information, see [g5ne, general purpose instance family with enhanced network performance](#).

- Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake) processors that can be overclocked to 3.2 GHz.
- Provides a fast and reliable network based on large computing capacity.
- Supports instance type changes to c6 or r6.
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - Websites 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Base bandwidth (Gbit/s)</th>
<th>Burstable 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>IPv4 address per ENI</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.g6.large</td>
<td>2</td>
<td>8.0</td>
<td>None</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</td>
</tr>
<tr>
<td>ecs.g6.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>None</td>
<td>1.5</td>
<td>5.0</td>
<td>500</td>
<td>Yes</td>
<td>4</td>
<td>3</td>
<td>10</td>
<td>20</td>
<td>1.5</td>
</tr>
<tr>
<td>ecs.g6.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<td>2.5</td>
<td>8.0</td>
<td>800</td>
<td>Yes</td>
<td>8</td>
<td>4</td>
<td>10</td>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td>ecs.g6.3xlarge</td>
<td>12</td>
<td>48.0</td>
<td>None</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>
<td>2.5</td>
</tr>
<tr>
<td>ecs.g6.4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>None</td>
<td>5.0</td>
<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</td>
</tr>
<tr>
<td>ecs.g6.6xlarge</td>
<td>24</td>
<td>96.0</td>
<td>None</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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### Elastic Compute Service Instance / 3 Instance families

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<th>vCPUs (GiB)</th>
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<th>Base bandwidth (Gbit/s)</th>
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**Note:**
- For more information about these specifications, see Instance specifications.

### g5, general purpose instance family

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

**Note:**
The maximum performance of disks varies with instance families. A single g5 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, storage optimized instance family with enhanced performance.

- Offers a CPU-to-memory ratio of 1:4.
- Provides an ultra high packet forwarding rate.
The maximum network performance varies with instance families. For higher packet forwarding rate, we recommend that you use g5ne. For more information, see g5ne, general purpose instance family with enhanced network performance.

- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - Small and medium-sized database systems, caches, and search clusters
  - Data analysis and computing
  - Compute clusters and memory intensive data processing

Instance types

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<th>Instance type</th>
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**Note:**
- For more information about these specifications, see [Instance specifications](#).

**g5se, memory optimized instance family with enhanced performance**

g5se is currently under invitational preview. To use g5se, you must submit a ticket.

Features:
- A single g5se instance attached with enhanced SSDs (ESSDs) can deliver a random read/write IOPS of up to 1,000,000 and a throughput of up to 32 Gbit/s.
- You can create g5se instances only on dedicated hosts.

**Note:**
For information about other types of instances that can be created on dedicated hosts, see [instance specifications](#).

- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Provides strong storage I/O performance with a large compute capacity.
- Offers a 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**
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<tr>
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<th>vCPUs</th>
<th>Memory (GiB)</th>
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**Note:**
For more information about these specifications, see [Instance specifications](#).

**g5ne, network enhanced instance family**

g5ne is under invitational preview. To use g5ne, [submit a ticket](#).

**Features**
• Instances of the g5ne instance family significantly improve network throughput and packet forwarding rate. A single g5ne instance can deliver up to 10,000 Kpps.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
• Offers a CPU-to-memory ratio of 1:4.
• I/O optimized.
• Supports standard SSDs and ultra disks.
• Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - Network intensive scenarios such as NFV or SD-WAN, mobile Internet, video live chat, and telecom data forwarding
  - Small and medium-sized database systems, caches, and search clusters
  - Enterprise-grade applications of various types and sizes
  - Big data analysis and machine learning

### 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>
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Note:
• For more information about these specifications, see Instance specifications.

ic5, compute intensive instance family

Features
• I/O optimized.
• Supports ESSDs, standard SSDs, and ultra disks.
• Offers a CPU-to-memory ratio of 1:1.
• Provides an ultra high packet forwarding rate.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
• Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - Web frontend servers
  - Data analysis, batch processing, and video encoding
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Frontend servers of MMO games

Instance types

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

**c6, compute optimized instance family**

**Features**
- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks.

**Note:**
The maximum performance of disks varies with instance families. A single c6 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, storage optimized instance family with enhanced performance.

- Provides high storage I/O performance based on large computing capacity.
- Allows you to enable or disable Hyper-Threading.
- Offers a CPU-to-memory ratio of 1:2.
- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake) processors that can be overclocked to 3.2 GHz.
- Provides a fast and reliable network based on large computing capacity.
- Supports instance type changes to g6 or r6.
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Web frontend servers
  - Frontend servers of massively multiplayer online (MMO) games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

<table>
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### Elastic Compute Service

#### Instance / 3 Instance families

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<td>200</td>
</tr>
</tbody>
</table>

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

#### c5, compute optimized instance family

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

**Note:**
The maximum performance of disks varies with instance families. A single c5 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, storage optimized instance family with enhanced performance.
- Offers a CPU-to-memory ratio of 1:2.
- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Web frontend servers
  - Frontend servers of MMO games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

### 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>
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<td>2</td>
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<tr>
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</tr>
</tbody>
</table>

**Note:**

• For more information about these specifications, see Instance specifications.
r6, memory optimized instance family

Features

• Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
• I/O optimized.
• Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks.

Note:
The maximum performance of disks varies with instance families. A single r6 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, storage enhanced instance family.

• Provides high storage I/O performance based on large computing capacity.
• Provides an ultra high packet forwarding rate.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake), up to 3.2 GHz Turbo Boost.
• Offers a CPU-to-memory ratio of 1:8.
• Allows you to enable or disable Hyper-Threading.
• Provides a fast and reliable network based on large computing capacity.
• Supports instance type changes to g6 or c6.
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - High-performance databases and in-memory databases
  - Data analysis, data mining, and distributed memory caching
  - Hadoop clusters, Spark clusters, and other memory-intensive enterprise applications

Instance types
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Basic band width (Gbit/s)</th>
<th>Burstable band width (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 address per ENI</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
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<td>5.0</td>
<td>500</td>
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<td>10</td>
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<td>10.0</td>
<td>1,000</td>
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<td>200</td>
<td>16</td>
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</tbody>
</table>

**Note:**
- For more information about these specifications, see [Instance specifications](#).
re6, memory optimized instance family with enhanced performance

Features

- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Optimized for high-performance databases, in-memory databases, and other memory-intensive enterprise applications.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake), up to 3.2 GHz Turbo Boost.
- Offers a CPU-to-memory ratio of 1:16 and up to 3 TiB 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 and Presto

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 queue</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
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<td>7</td>
<td>20</td>
<td>50</td>
<td>4</td>
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<td>20</td>
<td>200</td>
<td>16</td>
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</tbody>
</table>

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

r5, memory optimized instance family

Features
• I/O optimized.
• Supports ESSDs, standard SSDs, and ultra disks.

**Note:**
The maximum performance of disks varies with instance families. A single r5 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see [g5se, storage enhanced instance family](#).

• Provides an ultra high packet forwarding rate.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors or Intel® Xeon® Platinum 8269CY (Cascade Lake) processors.
• Offers a CPU-to-memory ratio of 1:8.
• Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - High-performance databases and in-memory databases
  - Data analysis, data mining, and distributed memory caching
  - Hadoop clusters, Spark clusters, and other memory-intensive enterprise applications

### 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>500</td>
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<td>2</td>
<td>3</td>
<td>10</td>
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<td>800</td>
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<td>4</td>
<td>10</td>
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<tr>
<td>ecs.r5. 3xlarge</td>
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<td>96.0</td>
<td>None</td>
<td>4.0</td>
<td>900</td>
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<td>6</td>
<td>10</td>
</tr>
<tr>
<td>ecs.r5. 4xlarge</td>
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<td>128.0</td>
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<td>5.0</td>
<td>1,000</td>
<td>Yes</td>
<td>4</td>
<td>8</td>
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</table>
### Elastic Compute Service

#### Instance / 3 Instance families

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
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<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
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<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<tbody>
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</table>

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

### d2s, storage intensive big data instance family

**Features:**
- I/O-optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.
- High-capacity local SATA HDDs with high throughput and a maximum of 35 Gbit/s bandwidth among instances.
- Supports online replacement and hot swapping of damaged disks to avoid instance shutdown.

If a local disk fails, you will receive a notification about the system event. You can respond to the system event by initiating the process to fix the damaged disk. For more information, see [*#unique_81*](#).

- If a backup disk is available on the physical machine, Alibaba Cloud will replace the damaged disk with the backup disk online.
- If no backup disk is available on the physical machine, the disk hardware must be replaced manually before Alibaba Cloud can replace the damaged disk.

**Notice:**
After you have started the process to fix the damaged disk, data in the damaged disk cannot be recovered.
Elastic Compute Service

- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Big data computing and storage business scenarios that use Hadoop MapReduce, HDFS, Hive, and HBase
  - Machine learning scenarios such as in-memory computing with Spark and scalable machine learning with MLlib
  - Search and log data processing scenarios that use solutions such as Elasticsearch and Kafka

## 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>20</td>
</tr>
</tbody>
</table>

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

### d1ne, big data instance family with enhanced network performance

Features:
- I/O optimized.
- Supports standard SSDs and ultra disks.
- High-capacity local SATA HDDs with high throughput and a maximum of 35 Gbit/s bandwidth among instances.
- Offers a CPU-to-memory ratio of 1:4, which is designed for big data scenarios.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios that use Hadoop MapReduce, HDFS, Hive, and HBase
  - Machine learning scenarios such as in-memory computing with Spark and scalable machine learning with MLlib
  - Use of solutions such as Elasticsearch for log 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>
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### Elastic Compute Service

**Instance / 3 Instance families**

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<th>Instance type</th>
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<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forward rate (Kpps)</th>
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<th>ENIs (including one primary ENI)</th>
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</tbody>
</table>

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

**i2, instance family with local SSDs**

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
- Offers a CPU-to-memory ratio of 1:8, which is designed for high-performance databases.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Online transaction processing (OLTP) and high-performance relational databases
  - NoSQL databases such as Cassandra, MongoDB, and HBase
  - Search scenarios that use solutions such as Elasticsearch

**Instance types**
### 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)</th>
<th>Packet forward rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP address per ENI</th>
<th>Disk bandwidth (Gbit/s)</th>
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**Note:**
- For more information about these specifications, see Instance specifications.
- For more information about the performance metrics of SSDs, see #unique_82.

### i2g, instance family with local SSDs

**Features**

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
- Offers a CPU-to-memory ratio of 1:4, which is designed for high-performance databases.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - OLTP and high-performance relational databases
  - NoSQL databases such as Cassandra, MongoDB, and HBase
  - Search scenarios that use solutions such as Elasticsearch
## Instance types

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<th>vCPUs</th>
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### Note:

- For more information about these specifications, see Instance specifications.
- For more information about the performance metrics of SSDs, see #unique_82.

### i2ne, instance family with local SSDs

i2ne is under invitational preview. To use i2ne, submit a ticket.

### Features

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
- Provides a bandwidth of up to 20 Gbit/s.
- Offers a CPU-to-memory ratio of 1:8, which is designed for high-performance databases.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
Suitable for the following scenarios:
- OLTP and high-performance relational databases
- NoSQL databases such as Cassandra, MongoDB, and HBase
- Search scenarios that use solutions such as Elasticsearch

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
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**Note:**
- For more information about the specifications, see [Instance specifications](#).
- For more information about the performance metrics of SSDs, see #unique_82.

**i2gne, instance family with local SSDs**

i2gne is under invitational preview. To use i2gne, submit a ticket.

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
Elastic Compute Service

Instance / 3 Instance families

- Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
- Provides a bandwidth of up to 20 Gbit/s.
- Offers a CPU-to-memory ratio of 1:4, which is designed for high-performance databases.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - OLTP and high-performance relational databases
  - NoSQL databases such as Cassandra, MongoDB, and HBase
  - Search scenarios that use solutions such as Elasticsearch

Instance types

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<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>
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<td>10</td>
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</table>

Note:

- For more information about these specifications, see Instance specifications.
- For more information about the performance metrics of SSDs, see #unique_82.
hfc6, compute optimized instance family with high clock speed

Features

- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks.
- Provides high storage I/O performance based on large computing capacity.
- Offers a CPU-to-memory ratio of 1:2.
- Provides an ultra high packet forwarding rate.
- Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake) processors that can be overclocked to 3.5 GHz.

Note:
The CPU of this instance family provides a 3.1 GHz clock speed. The Intel System Studio (ISS) feature may cause a lower clock speed to be displayed. Alibaba Cloud is trying to fix the display problem. The problem does not affect the actual clock speed of your instances.

- Allows you to enable or disable Hyper-Threading.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Web frontend servers
  - Frontend servers of massively multiplayer online (MMO) games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

Instance types
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</table>
hfg6, general purpose instance family with high clock speed

Features

- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Provides high storage I/O performance based on large computing capacity.
- Offers a CPU-to-memory ratio of 1:4.
- Provides an ultra high packet forwarding rate.
- Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake) processors that can be overclocked to 3.5 GHz.

Note:
The CPU of this instance family provides a 3.1 GHz clock speed. The Intel System Studio (ISS) feature may cause a lower clock speed to be displayed. Alibaba Cloud is trying to fix the display problem. The problem does not affect the actual clock speed of your instances.

- Allows you to enable or disable Hyper-Threading.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - Websites 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Base bandwidth (Gbit/s)</th>
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<th>Packet forwarding rate (Kpps)</th>
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<th>NIC queue (including one primary ENI)</th>
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</table>
hfr6, memory optimized instance family with high clock speed

Features

- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Provides high storage I/O performance based on large computing capacity.
- Offers a CPU-to-memory ratio of 1:8.
- Provides an ultra high packet forwarding rate.
- Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake) processors that can be overclocked to 3.5 GHz.

Note:
The CPU of this instance family provides a 3.1 GHz clock speed. The Intel System Studio (ISS) feature may cause a lower clock speed to be displayed. Alibaba Cloud is trying to fix the display problem. The problem does not affect the actual clock speed of your instances.

- Allows you to enable or disable Hyper-Threading.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - High-performance and in-memory databases
  - Data analysis, data mining, and distributed memory caching
  - Hadoop clusters, Spark clusters, and other memory intensive enterprise applications

Instance types
<table>
<thead>
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</table>
**Note:**
- For more information about these specifications, see Instance specifications.

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

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Offers a CPU-to-memory ratio of 1:4.
- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - 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>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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### Elastic Compute Service

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**Note:**

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

**sn1ne, compute optimized instance family with enhanced network performance**

**Features**

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Offers a CPU-to-memory ratio of 1:2.
- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Web frontend servers
  - Frontend servers of MMO games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

### 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>10</td>
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<td>1,300</td>
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<td>10</td>
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<td>4</td>
<td>8</td>
<td>20</td>
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<td>4.5</td>
<td>2,000</td>
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<td>8</td>
<td>8</td>
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</table>

**Note:**
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.
- Offers a CPU-to-memory ratio of 1:12 and up to 1,920.0 GiB memory.
- The ecs.re4.20xlarge and ecs.re4.40xlarge instance types are SAP HANA-certified.
- 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 and Presto

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>
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Note:

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

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.
- Offers a CPU-to-memory ratio of 1:24 and up to 3,840.0 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 and Presto

### Instance types

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<th>Instance type</th>
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**Note:**
- For more information about these specifications, see Instance specifications.

### se1ne, memory optimized instance family with enhanced network performance

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Offers a CPU-to-memory ratio of 1:8.
- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors or Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
Elastic Compute Service

Instance / 3 Instance families

- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - High-performance databases and in-memory databases
  - Data analysis, data mining, and distributed memory caching
  - Hadoop clusters, Spark clusters, and other memory-intensive enterprise applications

### Instance types

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<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>8</td>
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se1, memory optimized instance family

Features

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

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>
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### Instance type

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<th>Instance type</th>
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<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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<tbody>
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<td>1,200</td>
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<td>20</td>
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</tbody>
</table>

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

### d1, big data instance family

#### Features:
- I/O optimized.
- Supports standard SSDs and ultra disks.
- High-capacity local SATA HDDs with high throughput and up to 17 Gbit/s of bandwidth among instances.
- Offers a CPU-to-memory ratio of 1:4, which is designed for big data scenarios.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios that use Hadoop MapReduce, HDFS, Hive, and HBase
  - Machine learning scenarios such as in-memory computing with Spark and scalable machine learning with MLlib
  - Suitable for customers in Internet, finance, and other industries that need compute, store, and analyze big data
  - Use of solutions such as Elasticsearch for log data processing

### Instance types
### 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)</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>
<tr>
<td>ecs.d1.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>4 × 5, 500</td>
<td>3.0</td>
<td>300</td>
<td>No</td>
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<td>4</td>
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<td>400</td>
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<td>No</td>
<td>6</td>
<td>8</td>
<td>20</td>
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</tbody>
</table>

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

**i1, instance family with local SSDs**

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
- Offers a CPU-to-memory ratio of 1:4, which is designed for high-performance databases.
Elastic Compute Service

- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - OLTP and high-performance relational databases
  - NoSQL databases such as Cassandra and MongoDB
  - Search scenarios that use solutions such as Elasticsearch

### 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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<tr>
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<td>64.0</td>
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<td>8</td>
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<td>96.0</td>
<td>2 × 624</td>
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<td>2 × 832</td>
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<td>800</td>
<td>No</td>
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<td>128.0</td>
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<td>800</td>
<td>No</td>
<td>3</td>
<td>8</td>
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<td>No</td>
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</table>

**Note:**
Elastic Compute Service

- For more information about these specifications, see Instance specifications.
- For more information about the performance metrics of SSDs, see #unique_82.

hfc5, compute optimized instance family with high clock speed

Features

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Provides consistent computing performance.
- Equipped with 3.1 GHz Intel® Xeon® Gold 6149 (Skylake) processors.
- Offers a CPU-to-memory ratio of 1:2.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - High-performance web frontend servers
  - High-performance scientific and engineering applications
  - MMO gaming and video coding

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>
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<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<td>2</td>
<td>2</td>
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<td>500</td>
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<td>3</td>
<td>10</td>
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<td>16.0</td>
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<td>No</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
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<td>1,300</td>
<td>No</td>
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### Instance Specifications

<table>
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<th>Bandwidth (Gbit/s)</th>
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<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<td>None</td>
<td>3.0</td>
<td>1,600</td>
<td>No</td>
<td>4</td>
<td>8</td>
<td>20</td>
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<tr>
<td>ecs.hfc5.6xlarge</td>
<td>24</td>
<td>48.0</td>
<td>None</td>
<td>4.5</td>
<td>2,000</td>
<td>No</td>
<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.hfc5.8xlarge</td>
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<td>64.0</td>
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<td>6.0</td>
<td>2,500</td>
<td>No</td>
<td>8</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

**Note:**

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

### hfg5, general purpose instance family with high clock speed

**Features**

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Provides consistent computing performance.
- Equipped with 3.1 GHz Intel® Xeon® Gold 6149 (Skylake) processors.
- Offers a CPU-to-memory ratio of 1:4 (excluding the instance type with 56 vCPUs).
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - High-performance web frontend servers
  - High-performance scientific and engineering applications
  - MMO gaming and video coding

### 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>8.0</td>
<td>None</td>
<td>1.0</td>
<td>300</td>
<td>No</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs. hfg5. xlarge</td>
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<td>None</td>
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<td>500</td>
<td>No</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs. hfg5. 2xlarge</td>
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<td>32.0</td>
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<td>No</td>
<td>2</td>
<td>4</td>
<td>10</td>
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<td>12</td>
<td>48.0</td>
<td>None</td>
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<td>1,300</td>
<td>No</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>ecs. hfg5. 4xlarge</td>
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<td>64.0</td>
<td>None</td>
<td>3.0</td>
<td>1,600</td>
<td>No</td>
<td>4</td>
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<td>20</td>
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<tr>
<td>ecs. hfg5. 6xlarge</td>
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<td>96.0</td>
<td>None</td>
<td>4.5</td>
<td>2,000</td>
<td>No</td>
<td>6</td>
<td>8</td>
<td>20</td>
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<tr>
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<td>6.0</td>
<td>2,500</td>
<td>No</td>
<td>8</td>
<td>8</td>
<td>20</td>
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<tr>
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<td>10.0</td>
<td>4,000</td>
<td>No</td>
<td>14</td>
<td>8</td>
<td>20</td>
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</tbody>
</table>

**Note:**

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

**vgn6i, lightweight compute optimized instance family with GPU capabilities**

vgn6i is under invitational preview. To use vgn6i, submit a ticket.

**Features**

- I/O optimized.
Elastic Compute Service

- Supports standard SSDs and ultra disks.
- Uses NVIDIA T4 GPU computing accelerators.
- Contains virtual GPUs (vGPUs), which are the result of GPU virtualization with mediated pass-through.
  - Supports the 1/8, 1/4, and 1/2 computing capacity of NVIDIA® Tesla® T4 GPUs.
  - Supports 2, 4, and 8 GB of GPU memory.
- Offers a CPU-to-memory ratio of 1:5.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on 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>GPUs</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>
<th>Private IP addresses per ENI</th>
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<td>23.0</td>
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<td>1/4 x T4</td>
<td>4</td>
<td>3.0</td>
<td>500</td>
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<td>2</td>
<td>4</td>
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<td>10</td>
<td>46.0</td>
<td>None</td>
<td>1/2 x T4</td>
<td>8</td>
<td>4.0</td>
<td>800</td>
<td>Yes</td>
<td>4</td>
<td>5</td>
<td>20</td>
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</tbody>
</table>

### Note:
- For more information about these specifications, see Instance specifications.
gn6i, compute optimized instance family with GPU capabilities

Features

- I/O optimized.
- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Supports enhanced SSDs (ESSDs) that deliver millions of IOPS, standard SSDs, and ultra disks.
- Uses NVIDIA T4 GPU computing accelerators.
  - Powered by the new NVIDIA Turing architecture.
  - 16 GB GPU memory (320 GB/s bandwidth).
  - 2,560 CUDA cores per GPU.
  - Up to 320 Turing Tensor cores.
  - Mixed-precision Tensor cores support 65 FP16 TFLOPS, 130 INT8 TOPS, and 260 INT4 TOPS.
- Provides a fast and reliable network 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</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>
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<td>1 × T4</td>
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<td>500</td>
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<td>2</td>
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<td>4,800</td>
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<td>24</td>
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</tbody>
</table>

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

**gn6e, compute optimized instance family with GPU capabilities**

**Features**
- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Uses NVIDIA V100 (32 GB NVLink) GPU processors.
- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Uses NVIDIA V100 GPU computing accelerators that have the SXM2 module.
  - Powered by the new NVIDIA Volta architecture.
  - 32 GB HBM2 GPU memory (900 GB/s bandwidth).
  - 5,120 CUDA cores per GPU.
  - 640 Tensor cores per GPU.
  - Supports up to six NVLink connections and a total bandwidth of 300 GB/s (25 GB/s per connection).
- Provides a fast and reliable network 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 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>GPUs</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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### Elastic Compute Service

**Instance / 3 Instance families**

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
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<th>Local storage (GiB)</th>
<th>GPUs</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
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<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<tr>
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<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
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</tbody>
</table>

**Note:**

- For more information about these specifications, see [Instance specifications](#).

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

**Features**

- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Uses NVIDIA V100 GPU processors.
- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Uses NVIDIA V100 GPU computing accelerators that have the SXM2 module.
  - Powered by the new NVIDIA Volta architecture.
  - 16 GB HBM2 GPU memory (900 GB/s bandwidth).
  - 5,120 CUDA cores per GPU.
  - 640 Tensor cores per GPU.
  - Supports up to six NVLink connections and a total bandwidth of 300 GB/s (25 GB/s per connection).
- Provides a fast and reliable network based on large computing capacity.
Elastic Compute Service

- 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>GPUs</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
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<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<td>1 x 16</td>
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<td>800</td>
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<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

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

**f3, compute optimized instance family with FPGAs**

**Features:**
- I/O optimized.
Elastic Compute Service

- Supports standard SSDs and ultra disks.
- Uses Xilinx 16nm Virtex UltraScale+ VU9P FPGAs.
- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Deep learning and inference
  - Genomics research
  - Database acceleration
  - Image transcoding such as conversion of JPEG images to WebP images
  - Real-time video processing such as H.265 video compression

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)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
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<th>ENIs (including one primary ENI)</th>
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<td>None</td>
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<td>300</td>
<td>No</td>
<td>2</td>
<td>3</td>
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<td>8</td>
<td>32.0</td>
<td>None</td>
<td>1 × Xilinx VU9P</td>
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<td>500</td>
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<td>4</td>
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<td>4</td>
<td>8</td>
<td>20</td>
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<td>128.0</td>
<td>None</td>
<td>2 × Xilinx VU9P</td>
<td>10.0</td>
<td>2,000</td>
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<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>
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<td>336.0</td>
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<td>30.0</td>
<td>4,500</td>
<td>No</td>
<td>16</td>
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</tr>
</tbody>
</table>
Elastic Compute Service

Instance / 3 Instance families

Note:
• For more information about these specifications, see Instance specifications.

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.
• Offers a CPU-to-memory ratio of 1:3.
• Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
• Provides a fast and reliable network based on 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>
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<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 (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
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<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<tbody>
<tr>
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<td>6.0</td>
<td>None</td>
<td>1/8 x P4</td>
<td>1</td>
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<td>300</td>
<td>Yes</td>
<td>2</td>
<td>2</td>
<td>6</td>
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## Elastic Compute Service

<table>
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<th>Instance type</th>
<th>vCPUs</th>
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<th>Local storage (GiB)</th>
<th>GPUs</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>
<th>Private IP addresses per ENI</th>
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<td>500</td>
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<td>3</td>
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<td>24.0</td>
<td>None</td>
<td>1/2 × P4</td>
<td>4</td>
<td>3.0</td>
<td>800</td>
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<td>4</td>
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<td>1,000</td>
<td>Yes</td>
<td>4</td>
<td>5</td>
<td>20</td>
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</tbody>
</table>

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

---

**gn5, compute optimized instance family with GPU capabilities**

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Uses NVIDIA P100 GPU processors.
- Offers multiple CPU-to-memory ratios.
- Attached with high-performance local NVMe SSDs.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
Suitable for the following scenarios:

- Deep learning
- Scientific computing applications, such as fluid dynamics, finance, genomics, and environmental analysis
- Server-side GPU compute workloads such as high-performance computation, rendering, and multi-media coding and decoding

<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 (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>ecs. gn5-c4g1.xlarge</td>
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<td>440</td>
<td>1 x NVIDIA P100</td>
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<td>3.0</td>
<td>300</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
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<tr>
<td>ecs. gn5-c8g1.2xlarge</td>
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<td>60.0</td>
<td>440</td>
<td>1 x NVIDIA P100</td>
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<td>3.0</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs. gn5-c4g1.2xlarge</td>
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<td>60.0</td>
<td>880</td>
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<td>2 x 16</td>
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<td>1,000</td>
<td>No</td>
<td>2</td>
<td>4</td>
<td>10</td>
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<tr>
<td>ecs. gn5-c8g1.4xlarge</td>
<td>16</td>
<td>120.0</td>
<td>880</td>
<td>2 x NVIDIA P100</td>
<td>2 x 16</td>
<td>5.0</td>
<td>1,000</td>
<td>No</td>
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<td>1,000</td>
<td>No</td>
<td>8</td>
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<td>ecs. gn5-c8g1.8xlarge</td>
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<td>2,000</td>
<td>No</td>
<td>8</td>
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</table>
### gn5i, compute optimized instance family with GPU capabilities

#### Features
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Uses NVIDIA P4 GPU processors.
- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Deep learning and inference
  - Server-side GPU compute workloads such as multimedia encoding and decoding

#### 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>
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<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<tbody>
<tr>
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<td>56</td>
<td>224.0</td>
<td>880</td>
<td>2 × NVIDIA P100</td>
<td>2 × 16</td>
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<td>2,000</td>
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<td>14</td>
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<td>480.0</td>
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<td>No</td>
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<td>8</td>
<td>20</td>
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**Note:**
- For more information about these specifications, see Instance specifications.
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<th>Instance type</th>
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<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</th>
<th>GPU memory (GB)</th>
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<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
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<th>ENIs (including one primary ENI)</th>
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<td>1 x</td>
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<td>2</td>
<td>6</td>
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<tr>
<td>ecs. gn5i-c4g1.xlarge</td>
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<td>NVIDIA P4</td>
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<td>1.5</td>
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<td>3</td>
<td>10</td>
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<tr>
<td>ecs. gn5i-c8g1.2xlarge</td>
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<td>32.0</td>
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<td>NVIDIA P4</td>
<td>1 x 8</td>
<td>2.0</td>
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<td>4</td>
<td>10</td>
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<td>3.0</td>
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<tr>
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<td>2 x 8</td>
<td>10.0</td>
<td>Yes</td>
<td>14</td>
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<td>20</td>
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</tbody>
</table>

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

**gn4, compute optimized family with GPU capabilities**

Features
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Uses NVIDIA M40 GPU processors.
- Offers multiple CPU-to-memory ratios.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Deep learning
  - Scientific computing applications, such as fluid dynamics, finance, genomics, and environmental analysis
  - Server-side GPU compute workloads such as high-performance computation, rendering, and multi-media coding and decoding

<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 (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
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<th>ENIs (including one primary ENI)</th>
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<td>1 × 12</td>
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<td>3</td>
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<tr>
<td>ecs. gn4-c8g1.2xlarge</td>
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<td>400</td>
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<td>10</td>
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<td>1 × 12</td>
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<td>5.0</td>
<td>500</td>
<td>No</td>
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<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>
### f1, compute optimized instance family with FPGAs

**Features:**

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Uses Intel® Arria® 10 GX 1150 FPGAs.
- Offers a CPU-to-memory ratio of 1:7.5.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Deep learning and inference
  - Genomics research
  - Financial analysis
  - Image transcoding
  - Computational workloads such as real-time video processing and security management

---

**Note:**

- For more information about these specifications, see [Instance specifications](#).
### 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>FPGAs</th>
<th>Bandwidth (Gbit/s)</th>
<th>Packet forward rate (Kpps)</th>
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<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
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<tbody>
<tr>
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<td>8</td>
<td>60.0</td>
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</table>

**Note:**

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

**ebmgn6e, compute optimized ECS Bare Metal Instance family with GPU capabilities**

ebmgn6e is under invitational preview. To use ebmgn6e, submit a ticket.

**Features**

- Provides flexible and powerful software-defined compute based on the X-Dragon architecture
- I/O optimized
- Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks
- Uses NVIDIA V100 (32 GB NVLink) GPU processors
- CPU-to-memory ratio of 1:8
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors
- Uses NVIDIA V100 GPU computing accelerators (SXM2-based)
  - Powered by the new NVIDIA Volta architecture
  - 32 GB of HBM2 memory (900 GB/s bandwidth)
  - 5,120 CUDA Cores per GPU
  - 640 Tensor Cores
  - Supports up to six NVLink connections for a total bandwidth of 300 GB/s (25 GB/s per connection)
- Provides strong network performance proportional to computing capacity
- 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</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>
<th>Private IP addresses per ENI</th>
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<tbody>
<tr>
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<td>768.0</td>
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</table>

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

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

**Features**
- Provides 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 new NVIDIA Volta architecture
  - 16 GB of HBM2 memory (900 GB/s bandwidth)
  - 5,120 CUDA Cores per GPU
  - 640 Tensor Cores
  - Supports up to six NVLink connections for a total bandwidth of 300 GB/s (25 GB/s per connection)
- Provides strong network performance proportional to computing capacity
- 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</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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<td>8 x V100</td>
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<td>Yes</td>
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</table>

**Note:**
- For more information about these specifications, see Instance specifications.
ebmgn6i, compute optimized ECS Bare Metal Instance family with GPU capabilities

Features

• Provides 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 standard SSDs, ultra disks, and enhanced SSDs that deliver millions of IOPS
• 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
• 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
### Elastic Compute Service

- **Instance type**
- **vCPUs**
- **Memory (GiB)**
- **Local storage (GiB)**
- **GPUs**
- **GPU memory (GB)**
- **Bandwidth (Gbit/s)**
- **Packet forwarding rate (Kpps)**
- **IPv6 support**
- **NIC queues**
- **ENIs (including one primary ENI)**
- **Private IP addresses per ENI**

<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 (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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</tr>
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</table>

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

### 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
- Provides high network performance with a packet forwarding rate of 6,000 Kpps
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- 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 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 science and engineering applications
**Elastic Compute Service**

### 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>6,000</td>
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<td>32</td>
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</tbody>
</table>

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

**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
- 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

**Scenarios:**
- Workloads that require direct access to physical resources or 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-grade applications, such as large and medium-sized databases
- Computing clusters and memory-intensive data processing
- Data analysis and computing
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)</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>384</td>
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<td>6,000</td>
<td>Yes</td>
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<td>32</td>
<td>10</td>
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</tbody>
</table>

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

**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
- Scenarios:
  - Workloads that require direct access to physical resources or 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 clusters, Spark clusters, and other memory-intensive enterprise applications
<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>
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<td>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

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

**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
- 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 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>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>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 specifications](#).

**emhfg6**, 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
- Scenarios:
  - Workloads that require direct access to physical resources or 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-grade applications, such as large and medium-sized databases
  - Video encoding, decoding, and rendering

**Instance types**
### 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)</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>8</td>
<td>32</td>
<td>10</td>
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</tbody>
</table>

**Note:**

- For more information about these specifications, see [Instance specifications](#).

**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
- Scenarios:
  - Workloads that require direct access to physical resources or 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 clusters, Spark clusters, and other memory-intensive enterprise applications

**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)</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>8</td>
<td>32</td>
<td>10</td>
</tr>
</tbody>
</table>

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

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

**Features**
- I/O optimized
- Supports only standard SSDs and ultra disks
- CPU-to-memory ratio of 1:4
- Equipped with 3.7 GHz Intel® Xeon® E3-1240v6 (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
- Disabled automatic recovery
- Supports Intel® SGX
- 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-grade applications such as high-performance databases
### 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)</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>8</td>
<td>6</td>
<td>8</td>
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</tbody>
</table>

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

#### ebmc4, compute optimized ECS Bare Metal Instance family

**Features**
- I/O optimized
- Supports only 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
- Scenarios:
  - Workloads that require direct access to physical resources or 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-grade applications, such as large and medium-sized databases
  - Video encoding

**Instance types**
### 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)</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>10</td>
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</tbody>
</table>

Note:

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

### scch5, SCC instance family with high clock speed

Features

- I/O optimized.
- Supports only standard SSDs and ultra disks.
- Supports both RoCE and VPCs, of which RoCE is dedicated to RDMA communication.
- Provides all the features of ECS Bare Metal Instances.
- Equipped with 3.1 GHz Intel® Xeon® Gold 6149 (Skylake) processors.
- Offers a 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 processing, 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 queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<tbody>
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<td>No</td>
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<td>10</td>
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</tbody>
</table>

**Note:**
- ecs.scch5.16xlarge provides 64 logical processors on 32 physical cores.
- For more information about these specifications, see Instance specifications.

### sccg5, general purpose SCC instance family

**Features**
- I/O optimized.
- Supports only standard SSDs and ultra disks.
- Supports both RoCE and VPCs, of which RoCE is dedicated to RDMA communication.
- Provides all the features of ECS Bare Metal Instances.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Offers a 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 processing, and video encoding

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

<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 queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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</thead>
<tbody>
<tr>
<td>ecs.sccg5.24xlarge</td>
<td>96</td>
<td>48</td>
<td>384.0</td>
<td>None</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 specifications.

**sccgn6, compute optimized SCC instance family with GPU capabilities**

**Features**

- I/O optimized.
- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides all the features of ECS Bare Metal Instances.
- Storage:
  - Supports ESSDs, standard SSDs, and ultra disks.
  - Supports a high performance CPFS.
- Networking:
  - Supports VPCs.
  - Supports the RoCE v2 network, which is dedicated to low-latency RDMA communication.
• Uses NVIDIA V100 GPU processors that have the SXM2 module:
  - Powered by the new NVIDIA Volta architecture.
  - 16 GB HBM2 GPU memory.
  - 5,120 CUDA cores.
  - 640 Tensor cores.
  - Offers a GPU memory bandwidth of up to 900 GB/s.
  - Supports up to six NVLink connections and a 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 processing, 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>
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</thead>
<tbody>
<tr>
<td>ecs.sccgn6.24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>None</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:**

• For more information about these specifications, see Instance specifications.

**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
• 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 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>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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<tbody>
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<td>192.0</td>
<td>None</td>
<td>30.0</td>
<td>4,500</td>
<td>No</td>
<td>8</td>
<td>32</td>
<td>10</td>
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</tbody>
</table>

Note:
• For more information about these specifications, see Instance specifications.

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
• Scenarios:
  - Workloads that require direct access to physical resources or 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-grade applications, such as large and medium-sized databases
  - Video encoding

Instance types

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<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>384.0</td>
<td>None</td>
<td>30.0</td>
<td>4,500</td>
<td>No</td>
<td>8</td>
<td>32</td>
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</table>

**Note:**

• For more information about these specifications, see Instance specifications.

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

**Features**

• I/O optimized
• Supports enhanced SSDs, standard SSDs, and ultra disks
Elastic Compute Service

Instance / 3 Instance families

- 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
- Scenarios:
  - Workloads that require direct access to physical resources or 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 clusters, Spark clusters, and other memory-intensive enterprise applications

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>8</td>
<td>32</td>
<td>10</td>
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</table>

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

ebmg5, general purpose ECS Bare Metal Instance family

Features
- I/O optimized
- Supports only standard SSDs and ultra disks
Elastic Compute Service

Instance / 3 Instance families

- 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
- Scenarios:
  - Workloads that require direct access to physical resources or 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-grade applications, such as large and medium-sized databases
  - Video encoding

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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<tbody>
<tr>
<td>ecs. ebmg5. 24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>None</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 specifications.

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 when compared with the t5 burstable instance family.
- Delivers a bandwidth of up to 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

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Baseline CPU performance</th>
<th>CPU credits per hour (max)</th>
<th>Max CPU credits balance</th>
<th>Local storage (GiB)</th>
<th>Base bandwidth (Gbit/s)</th>
<th>Packet forward rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues (incl. one primary ENI)</th>
<th>ENIs per ENI</th>
<th>Private IP addresses per ENI</th>
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<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>None</td>
<td>0.08</td>
<td>40</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</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>None</td>
<td>0.08</td>
<td>60</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</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>None</td>
<td>0.08</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</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>0.08</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Instance type</td>
<td>vCPUs</td>
<td>Memory (GiB)</td>
<td>Baseline CPU computing performance</td>
<td>Max CPU credits per hour</td>
<td>Local storage (GiB)</td>
<td>Base 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 per ENI</td>
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<tr>
<td>ecs.t6-c1m4.large</td>
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<td>30%</td>
<td>36</td>
<td>None</td>
<td>0.08</td>
<td>100</td>
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<td>2</td>
<td>2</td>
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<td>ecs.t6-c1m4.xlarge</td>
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<td>16.0</td>
<td>40%</td>
<td>96</td>
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<td>0.16</td>
<td>200</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
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<tr>
<td>ecs.t6-c1m4.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>40%</td>
<td>192</td>
<td>None</td>
<td>0.32</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- When you bind or unbind an ENI, instances of the following instance types must be in the stopped state: ecs.t6-c1m1.large, ecs.t6-c1m2.large, ecs.t6-c1m4.large, ecs.t6-c2m1.large, and ecs.t6-c4m1.large.
- For more information about these specifications, see Instance specifications.

**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

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Mem (GiB)</th>
<th>Base CPU computing performance</th>
<th>Max CPU credit 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 (including one primary ENI)</th>
<th>ENIs</th>
<th>Private IP addresses per 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>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
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<td>1.0</td>
<td>20%</td>
<td>12</td>
<td>288</td>
<td>None</td>
<td>0.2</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.t5-lc1m2.small</td>
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<td>2.0</td>
<td>20%</td>
<td>12</td>
<td>288</td>
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<td>0.2</td>
<td>Yes</td>
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<td>2</td>
<td>2</td>
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<td>576</td>
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<td>Memory (GiB)</td>
<td>Baseline CPU computing performance</td>
<td>Max CPU credit per hour</td>
<td>Local storage (GiB)</td>
<td>Bandwidth (Gbit/s)</td>
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<td>IPv6 support</td>
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<td>ENIs</td>
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<td>576</td>
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<td>2</td>
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<td>ecs.t5-c1m2.large</td>
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<td>30</td>
<td>720</td>
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<td>25%</td>
<td>30</td>
<td>720</td>
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<td>0.5</td>
<td>100</td>
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<td>1,440</td>
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<td>ENIs (including one primary ENI)</td>
<td>Private IP addresses per ENI</td>
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<td>ecs.t5-c1m4.xlarge</td>
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<td>25%</td>
<td>60</td>
<td>1,440</td>
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<td>0.8</td>
<td>200</td>
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<td>1</td>
<td>2</td>
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<td>8.0</td>
<td>25%</td>
<td>120</td>
<td>2,880</td>
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<td>1.2</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
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<tr>
<td>ecs.t5-c1m2.2xlarge</td>
<td>8</td>
<td>16.0</td>
<td>25%</td>
<td>120</td>
<td>2,880</td>
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<td>25%</td>
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<td>2,880</td>
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<td>32.0</td>
<td>25%</td>
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<td>5,760</td>
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<td>1.2</td>
<td>600</td>
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</table>
Note:

- When you bind or unbind an ENI, instances of the following instance types must be in the stopped state: ecs.t5-lc2m1.nano, ecs.t5-c1m1.large, ecs.t5-c1m2.large, ecs.t5-c1m4.large, ecs.t5-lc1m1.small, ecs.t5-lc1m2.large, ecs.t5-lc1m2.small, and ecs.t5-lc1m4.large.
- For more information about these specifications, see Instance specifications.

v5, CPU overprovisioned instance family

Features:

- Supports a range of CPU-to-memory ratios, such as 1:1, 1:2, 1:4, and 1:8.
- You can create v5 instances only on dedicated hosts.

Note:

For information about other types of instances that can be created on dedicated hosts, see #unique_80.

- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Equipped with 2.5 GHz Intel * Xeon * Platinum 8163 (Skylake) processors.
- Suitable for the following scenarios:
  - Migration from offline virtualization environments to Alibaba Cloud
  - Services that generate low, medium, or burstable CPU loads

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (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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<tbody>
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<td>Bandwidth (Gbit/s)</td>
<td>Packet forwarding 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>
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<td>3.0</td>
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<td>128.0</td>
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<td>500</td>
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<td>ecs.v5-c1m8.8xlarge</td>
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<td>256.0</td>
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<td>500</td>
<td>Yes</td>
<td>8</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>
s6, shared standard instance family

Features:

- More cost-effective than the previous-generation shared instance families (xn4, n4, mn4, and e4)
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake), with Turbo Boost up to 3.2 GHz for consistent computing performance
- Paired with DDR4 memory
- Supports multiple CPU-to-memory ratios, such as 1:1, 1:2, and 1:4
- I/O-optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- Supports VPCs only
- Scenarios:
  - Small and medium-sized websites, and web applications
  - Development environments, servers, code repositories, microservices, and testing and staging environments
  - Lightweight databases and caches
  - Lightweight enterprise applications and integrated application services

The following table describes the instance types that belong to the s6 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>Base 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>
<tr>
<td>ecs.s6-c1m1.small</td>
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<td>1.0</td>
<td>None</td>
<td>0.1</td>
<td>150</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
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<tr>
<td>ecs.s6-c1m2.small</td>
<td>1</td>
<td>2.0</td>
<td>None</td>
<td>0.1</td>
<td>150</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPUs</td>
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<td>Local storage (GiB)</td>
<td>Base bandwidth (Gbit/s)</td>
<td>Packet forwarding 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>
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<td>----------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>ecs.s6-c1m1.small</td>
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<td>150</td>
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<td>2</td>
</tr>
<tr>
<td>ecs.s6-c1m2.large</td>
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<td>4.0</td>
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<td>0.2</td>
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<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.s6-c1m4.large</td>
<td>2</td>
<td>8.0</td>
<td>None</td>
<td>0.4</td>
<td>200</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.s6-c1m2.xlarge</td>
<td>4</td>
<td>8.0</td>
<td>None</td>
<td>0.4</td>
<td>300</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.s6-c1m4.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>None</td>
<td>0.8</td>
<td>300</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.s6-c1m2.2xlarge</td>
<td>8</td>
<td>16.0</td>
<td>None</td>
<td>0.8</td>
<td>600</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.s6-c1m4.2xlarge</td>
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<td>32.0</td>
<td>None</td>
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<td>600</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
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</tbody>
</table>

**Note:**

- To bind or unbind an ENI, instances of the following instance types must be in the stopped state: ecs.s6-c1m1.small, ecs.s6-c1m2.large, ecs.s6-c1m2.small, ecs.s6-c1m4.large, and ecs.s6-c1m4.small.
- For more information about the specifications, see Instance specifications.

**Previous-generation shared instance families**

Features of xn4, n4, mn4, and e4:
* Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors
* Paired with DDR4 memory
* Supports multiple CPU-to-memory ratios

<table>
<thead>
<tr>
<th>Instance family</th>
<th>Description</th>
<th>vCPU-to-memory ratio</th>
<th>Scenario</th>
</tr>
</thead>
</table>
| xn4             | Shared compact type          | 1:1                  | • Frontend web applications  
                        • Lightweight applications and microservices  
                        • Applications for development or testing environments |
| n4              | Shared compute type          | 1:2                  | • Websites and web applications  
                        • Development environments, servers, code repositories, microservices, and testing and staging environments  
                        • Lightweight enterprise applications |
| mn4             | Shared balanced type         | 1:4                  | • Websites and web applications  
                        • Lightweight databases and caches  
                        • Integrated applications and lightweight enterprise services |
The following table describes the instance types that belong to the e4 instance family and specifications of these instance types.

<table>
<thead>
<tr>
<th>Instance family</th>
<th>Description</th>
<th>vCPU-to-memory ratio</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>e4</td>
<td>Shared memory type</td>
<td>1:8</td>
<td>• Applications that require a large 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 specifications of these instance types.

<table>
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<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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<tr>
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<td>None</td>
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<td>50</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>2</td>
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</table>

Note:
- To bind or unbind an ENI, instances of the ecs.xn4.small instance type must be in the stopped state.
- For more information about the specifications, see Instance specifications.

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

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<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
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<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<tbody>
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<td>2</td>
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### Instance / 3 Instance families

<table>
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<th>Local storage (GiB)</th>
<th>Bandwidth (Gbit/s)</th>
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<th>IPv6 support</th>
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<tr>
<td>ecs.n4.2xlarge</td>
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<td>16.0</td>
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</table>

**Note:**
- To bind or unbind an ENI, instances of the `ecs.n4.small` and `ecs.n4.large` instance types must be in the stopped state.
- For more information about the specifications, see Instance specifications.

The following table describes the instance types that belong to the `mn4` instance family and specifications of these instance types.

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<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>50</td>
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</table>
### Elastic Compute Service

#### Instance / 3 Instance families

<table>
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<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>
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<tr>
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<td>32.0</td>
<td>None</td>
<td>1.2</td>
<td>300</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
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<tr>
<td>ecs. mn4. 4xlarge</td>
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<td>64.0</td>
<td>None</td>
<td>2.5</td>
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<td>No</td>
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<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs. mn4. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>None</td>
<td>5</td>
<td>500</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:**

- To bind or unbind an ENI, instances of the ecs.mn4.small and ecs.mn4.large instance types must be in the stopped state.
- For more information about the specifications, see Instance specifications.

The following table describes the instance types that belong to the e4 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)</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.e4. small</td>
<td>1</td>
<td>8.0</td>
<td>None</td>
<td>0.5</td>
<td>50</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.e4. large</td>
<td>2</td>
<td>16.0</td>
<td>None</td>
<td>0.5</td>
<td>100</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<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>Instance type</td>
<td>vCPUs (GiB)</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>Bandwidth (Gbit/s)</td>
<td>Packet forwarding 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>
<td>---------------------</td>
<td>-------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>-----------------------------</td>
<td>--------------</td>
<td>------------</td>
<td>---------------------------------</td>
<td>-----------------------------</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:**

- To bind or unbind an ENI, instances of the ecs.e4.small and ecs.e4.large instance types must be in the stopped state.
- For more information about these specifications in the table, see Instance specifications.

### Instance specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local storage</td>
<td>Local storage is also called cache disks or local disks. Local storage refers to the disks attached to the physical servers on which the ECS instances are hosted. Local storage provides temporary block storage for instances. Local storage capacity is measured in GiB. Data stored on the local disks may be lost when the compute resources (vCPUs and memory) of an instance are released or if the instance is migrated upon host failures. For more information, see Local disks.</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>The maximum bandwidth in one direction. Inbound bandwidth and outbound bandwidth are calculated separately.</td>
</tr>
<tr>
<td>Packet forwarding rate</td>
<td>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.</td>
</tr>
<tr>
<td>NIC queues</td>
<td>The maximum number of NIC queues that the primary NIC of an instance can support. If your instance type is not a member 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>
</tr>
<tr>
<td>ENIs</td>
<td>Enterprise-grade instance types that are equipped with two or more vCPUs support Elastic Network Interfaces (ENIs). Shared instance types that are equipped with four or more vCPUs support ENIs. For more information, see ENI overview.</td>
</tr>
</tbody>
</table>
4 Instance type families

4.1 General purpose instance families

This topic describes the features of general purpose instance families of ECS and lists the instance types of each family.

- **Recommended instance families**
  - g6, general purpose instance family
  - g5, general purpose instance family
  - g5ne, network enhanced instance family

- **Other available instance families**
  - sn2ne, general purpose instance family with enhanced network performance

**g6, general purpose instance family**

Features

- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks.

**Note:**
The maximum performance of disks varies with instance families. A single g6 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see **g5se, storage optimized instance family with enhanced performance.**

- Provides high storage I/O performance based on large computing capacity.

**Note:**
For more information about the storage I/O performance of the new generation of enterprise-level instance families, see #unique_86.

- Offers a CPU-to-memory ratio of 1:4.
• Allows you to enable or disable Hyper-Threading.

**Note:**
By default, Hyper-Threading is enabled on ECS instances. For more information, see Customize CPU options.

• Provides an ultra high packet forwarding rate.

**Note:**
The maximum network performance varies with instance families. For higher packet forwarding rate, we recommend that you use g5ne. For more information, see g5ne, general purpose instance family with enhanced network performance.

• Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake) processors that can be overclocked to 3.2 GHz.

• Provides a fast and reliable network based on large computing capacity.

• Supports instance type changes to c6 or r6.

• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - Websites 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>vCPUs</th>
<th>Mem (GiB)</th>
<th>Local storage (GiB)</th>
<th>Base bandwidth (Gbit/s)</th>
<th>Burstable 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>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
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</thead>
<tbody>
<tr>
<td>ecs .g6. large 2</td>
<td>2</td>
<td>8.0</td>
<td>None</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</td>
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<tr>
<td>ecs .g6. xlarge 4</td>
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<td>16.0</td>
<td>None</td>
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<td>5.0</td>
<td>500</td>
<td>Yes</td>
<td>4</td>
<td>3</td>
<td>10</td>
<td>20</td>
<td>1.5</td>
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<tr>
<td>ecs .g6. 2xlarge 8</td>
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<td>32.0</td>
<td>None</td>
<td>2.5</td>
<td>8.0</td>
<td>800</td>
<td>Yes</td>
<td>8</td>
<td>4</td>
<td>10</td>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td>ecs .g6. 3xlarge 12</td>
<td>12</td>
<td>48.0</td>
<td>None</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>
<td>2.5</td>
</tr>
<tr>
<td>ecs .g6. 4xlarge 16</td>
<td>16</td>
<td>64.0</td>
<td>None</td>
<td>5.0</td>
<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</td>
</tr>
<tr>
<td>ecs .g6. 6xlarge 24</td>
<td>24</td>
<td>96.0</td>
<td>None</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>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>ecs .g6. 8xlarge 32</td>
<td>32</td>
<td>128.0</td>
<td>None</td>
<td>10.0</td>
<td>None</td>
<td>2,000</td>
<td>Yes</td>
<td>16</td>
<td>8</td>
<td>20</td>
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<tr>
<td>ecs .g6. 13xlarge 52</td>
<td>52</td>
<td>192.0</td>
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<td>None</td>
<td>3,000</td>
<td>Yes</td>
<td>32</td>
<td>7</td>
<td>20</td>
<td>100</td>
<td>8</td>
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<td>ecs .g6. 26xlarge 104</td>
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<td>32</td>
<td>15</td>
<td>20</td>
<td>200</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 specifications.

**g5, general purpose instance family**

**Features**

• I/O optimized.

• Supports ESSDs, standard SSDs, and ultra disks.

**Note:**
The maximum performance of disks varies with instance families. A single g5 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, storage optimized instance family with enhanced performance.

• Offers a CPU-to-memory ratio of 1:4.

• Provides an ultra high packet forwarding rate.

**Note:**
The maximum network performance varies with instance families. For higher packet forwarding rate, we recommend that you use g5ne. For more information, see g5ne, general purpose instance family with enhanced network performance.

• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.

• Provides a fast and reliable network based on large computing capacity.

• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - 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>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.g5.large</td>
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<td>8.0</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.g5.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>None</td>
<td>1.5</td>
<td>500</td>
<td>Yes</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs.g5.2xlarge</td>
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<td>32.0</td>
<td>None</td>
<td>2.5</td>
<td>800</td>
<td>Yes</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>ecs.g5.3xlarge</td>
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<td>48.0</td>
<td>None</td>
<td>4.0</td>
<td>900</td>
<td>Yes</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>ecs.g5.4xlarge</td>
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<td>64.0</td>
<td>None</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.g5.6xlarge</td>
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<td>96.0</td>
<td>None</td>
<td>7.5</td>
<td>1,500</td>
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<td>6</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.g5.8xlarge</td>
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<td>8</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>ecs.g5.16xlarge</td>
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<td>256.0</td>
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<td>20.0</td>
<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 specifications](#).

**g5ne, network enhanced instance family**

g5ne is under invitational preview. To use g5ne, [submit a ticket](#).

**Features**

- Instances of the g5ne instance family significantly improve network throughput and packet forwarding rate. A single g5ne instance can deliver up to 10,000 Kpps.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Offers a CPU-to-memory ratio of 1:4.
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Network intensive scenarios such as NFV or SD-WAN, mobile Internet, video live chat, and telecom data forwarding
  - Small and medium-sized database systems, caches, and search clusters
  - Enterprise-grade applications of various types and sizes
  - Big data analysis and machine learning

<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 queue</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. g5ne. 2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<td>3.5</td>
<td>1,500</td>
<td>Yes</td>
<td>8</td>
<td>4</td>
<td>10</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td>ecs. g5ne. 4xlarge</td>
<td>16</td>
<td>64.0</td>
<td>None</td>
<td>7.0</td>
<td>3,000</td>
<td>Yes</td>
<td>16</td>
<td>6</td>
<td>20</td>
<td>60</td>
<td>2</td>
</tr>
<tr>
<td>ecs. g5ne. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>None</td>
<td>15.0</td>
<td>6,000</td>
<td>Yes</td>
<td>16</td>
<td>6</td>
<td>20</td>
<td>120</td>
<td>4</td>
</tr>
<tr>
<td>ecs. g5ne. 16xlarge</td>
<td>64</td>
<td>256.0</td>
<td>None</td>
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<td>6</td>
<td>20</td>
<td>240</td>
<td>8</td>
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<tr>
<td>ecs. g5ne. 18xlarge</td>
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<td>Yes</td>
<td>32</td>
<td>8</td>
<td>20</td>
<td>270</td>
<td>9</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.
sn2ne, general purpose instance family with enhanced network performance

Features

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Offers a CPU-to-memory ratio of 1:4.
- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - 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>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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<tr>
<td>ecs. sn2ne. large</td>
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<td>None</td>
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<td>300</td>
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<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
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<td>None</td>
<td>1.5</td>
<td>500</td>
<td>Yes</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs. sn2ne. 2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<td>2.0</td>
<td>1,000</td>
<td>Yes</td>
<td>4</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 (Gbit/s)</td>
<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>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>None</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>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. sn2ne. 8xlarge</td>
<td>32</td>
<td>128.0</td>
<td>None</td>
<td>6.0</td>
<td>2,500</td>
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<td>8</td>
<td>8</td>
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<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 specifications](#).

**References**
- [Instance families](#)
- [Create an instance by using the provided wizard](#)
4.2 Compute optimized instance families

This topic describes the features of ECS compute optimized instance families and lists the instance types of each family.

- Recommended instance families
  - c6, compute optimized instance family
  - c5, compute optimized instance family
  - ic5, compute intensive instance family

- Other available instance families
  - sn1ne, compute optimized instance family with enhanced network performance

**c6, compute optimized instance family**

Features

- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks.

**Note:**
The maximum performance of disks varies with instance families. A single c6 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, storage optimized instance family with enhanced performance.

- Provides high storage I/O performance based on large computing capacity.

**Note:**
For more information about the storage I/O performance of the new generation of enterprise-level instance families, see #unique_86.

- Allows you to enable or disable Hyper-Threaded.

**Note:**
By default, Hyper-Threading is enabled on ECS instances. For more information, see Customize CPU options.

- Offers a CPU-to-memory ratio of 1:2.
• Provides an ultra high packet forwarding rate.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake) processors that can be overclocked to 3.2 GHz.
• Provides a fast and reliable network based on large computing capacity.
• Supports instance type changes to g6 or r6.
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Web frontend servers
  - Frontend servers of massively multiplayer online (MMO) games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

### 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>Bursting bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENIs (include one primary ENI)</th>
<th>Private IPAddresses per ENI</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</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 specifications](#).

**c5, compute optimized instance family**

**Features**

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

**Note:**
The maximum performance of disks varies with instance families. A single c5 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see [g5se, storage optimized instance family with enhanced performance](#).
- Offers a CPU-to-memory ratio of 1:2.
• Provides an ultra high packet forwarding rate.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
• Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Web frontend servers
  - Frontend servers of MMO games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

### 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>
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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 specifications](#).

### ic5, compute intensive instance family

**Features**

- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Offers a CPU-to-memory ratio of 1:1.
- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) or 8269CY (Cascade Lake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Web frontend servers
  - Data analysis, batch processing, and video encoding
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Frontend servers of MMO games

### Instance types

<table>
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<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>
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<td>10</td>
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<td>No</td>
<td>4</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 specifications](#).

**sn1ne, compute optimized instance family with enhanced network performance**

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Offers a CPU-to-memory ratio of 1:2.
- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) or Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Web frontend servers
  - Frontend servers of MMO games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

**Instance types**
<table>
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<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>
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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 specifications](#).

**References**
- Instance families
- Create an instance by using the provided wizard
4.3 Memory optimized instance families

This topic describes the features of memory optimized instance families and their instance types.

- Recommended instance families
  - r6, memory optimized instance family
  - re6, memory optimized instance family with enhanced performance
  - r5, memory optimized instance family
- Other available 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
  - se1, memory optimized instance family

r6, memory optimized instance family

Features

- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks.

**Note:**
The maximum performance of disks varies with instance families. A single r6 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, storage enhanced instance family.

- Provides high storage I/O performance based on large computing capacity.

**Note:**
For more information about the storage I/O performance of the new generation of enterprise-level instance families, see #unique_86.

- Provides an ultra high packet forwarding rate.
  * Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake), up to 3.2 GHz Turbo Boost.
  * Offers a CPU-to-memory ratio of 1:8.
• Allows you to enable or disable Hyper-Threading.

**Note:**
By default, Hyper-Threading is enabled on ECS instances. For more information, see [Customize CPU options](#).

• Provides a fast and reliable network based on large computing capacity.

• Supports instance type changes to g6 or c6.

• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - High-performance databases and in-memory databases
  - Data analysis, data mining, and distributed memory caching
  - Hadoop clusters, Spark clusters, and other memory-intensive enterprise applications

**Instance types**

<table>
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<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
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<th>Packet forwarding rate (Kpps)</th>
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### Instance / 4 Instance type families

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<td>768.0</td>
<td>None</td>
<td>25.0</td>
<td>None</td>
<td>6,000</td>
<td>Yes</td>
<td>32</td>
<td>15</td>
<td>20</td>
<td>200</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 specifications.

**re6, memory optimized instance family with enhanced performance**

**Features**
- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Optimized for high-performance databases, in-memory databases, and other memory-intensive enterprise applications.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake), up to 3.2 GHz Turbo Boost.
• Offers a CPU-to-memory ratio of 1:16 and up to 3 TiB 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 and Presto

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 queue (including primary ENI)</th>
<th>ENIs (Private IP addresses per ENI)</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
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<td>ecs. re6. 13xlarge</td>
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<td>768.0</td>
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<td>10.0</td>
<td>1,800</td>
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<td>Yes</td>
<td>32</td>
<td>15</td>
<td>20</td>
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</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 specifications.

r5, memory optimized instance family

Features

• I/O optimized.

• Supports ESSDs, standard SSDs, and ultra disks.

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 specifications.
The maximum performance of disks varies with instance families. A single r5 instance can deliver up to 200,000 IOPS. For higher storage I/O performance, we recommend that you use g5se. For more information, see g5se, storage enhanced instance family.

- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors or Intel® Xeon® Platinum 8269CY (Cascade Lake) processors.
- Offers a CPU-to-memory ratio of 1:8.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - High-performance databases and in-memory databases
  - Data analysis, data mining, and distributed memory caching
  - Hadoop clusters, Spark clusters, and other memory-intensive enterprise applications

### 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>16.0</td>
<td>None</td>
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<td>300</td>
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<td>2</td>
<td>2</td>
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<tr>
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<td>32.0</td>
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<td>500</td>
<td>Yes</td>
<td>2</td>
<td>3</td>
<td>10</td>
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<tr>
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<td>8</td>
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<td>800</td>
<td>Yes</td>
<td>2</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
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<td>12</td>
<td>96.0</td>
<td>None</td>
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<td>900</td>
<td>Yes</td>
<td>4</td>
<td>6</td>
<td>10</td>
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<tr>
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<td>4</td>
<td>8</td>
<td>20</td>
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<tr>
<td>ecs.r5. 6xlarge</td>
<td>24</td>
<td>192.0</td>
<td>None</td>
<td>7.5</td>
<td>1,500</td>
<td>Yes</td>
<td>6</td>
<td>8</td>
<td>20</td>
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<td>ecs.r5. 8xlarge</td>
<td>32</td>
<td>256.0</td>
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### 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>Yes</td>
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<td>8</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 specifications](#).

### 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.
- Offers a CPU-to-memory ratio of 1:12 and up to 1,920.0 GiB memory.
- The ecs.re4.20xlarge and ecs.re4.40xlarge instance types are SAP HANA-certified.
- 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 and Presto

**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)</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>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 specifications](#).

**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.
- Offers a CPU-to-memory ratio of 1:24 and up to 3,840.0 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 and Presto

**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>
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<td>3,840.0</td>
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<td>Yes</td>
<td>16</td>
<td>15</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 specifications](#).

**se1ne, memory optimized instance family with enhanced network performance**

**Features**

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Offers a CPU-to-memory ratio of 1:8.
- Provides an ultra high packet forwarding rate.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors or Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - High-performance databases and in-memory databases
  - Data analysis, data mining, and distributed memory caching
  - Hadoop clusters, Spark clusters, and other memory-intensive enterprise applications

**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.se1ne.large</td>
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<td>16.0</td>
<td>None</td>
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<td>300</td>
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<td>6</td>
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<td>10</td>
</tr>
<tr>
<td>ecs.se1ne.3xlarge</td>
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<td>96.0</td>
<td>None</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.se1ne.4xlarge</td>
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<td>128.0</td>
<td>None</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.se1ne.6xlarge</td>
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<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>
</tr>
<tr>
<td>ecs.se1ne.14xlarge</td>
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<td>10.0</td>
<td>4,500</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 specifications](#).

**se1, memory optimized instance family**

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

### 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>
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<td>ecs.se1.large</td>
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<td>16.0</td>
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<td>0.5</td>
<td>100</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.se1.xlarge</td>
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<td>32.0</td>
<td>None</td>
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<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
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<tr>
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<td>64.0</td>
<td>None</td>
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<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>
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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 specifications.

References

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

4.4 Big data instance families

This topic describes the features of big data instance families and lists the instance types of each family.

• Recommended instance families
  - d2s, storage intensive big data instance family
  - d1ne, big data instance family with enhanced network performance
• Other available instance families
  - d1, big data instance family

Description

Big data instance families are designed to deliver cloud computing and storage for a large amount of data to support big data-oriented business needs. These instances are applicable to scenarios that require offline computing and storage of a large amount of data, such as Hadoop distributed computing, extensive log processing, and large-scale data warehousing. The instance families are suitable for businesses that use a distributed network and require high-performance storage systems.

These instance families are suitable for customers in Internet, finance, and other industries that need to compute, store, and analyze big data. Big data instance families use local storage to ensure a large amount of storage space and high storage performance.

Common features of big data instances:

• Enterprise-level computing power ensures efficient and stable data processing.
• More bandwidth per instance and higher packet forwarding rates enhance network performance. Enhanced network performance ensures that the network can withstand the demands at peak times.
• When you create an instance for the first time, disks require time to warm up before they can achieve optimal performance. Big data instances provide a sequential read and write performance of 190 MB/s for a single disk and a maximum storage throughput of 5 GB/s for a single instance. This can 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 standard SSDs, a huge reduction in costs for building Hadoop clusters.

When you use big data instances, take note of the following items:

• Instances with local SSDs do not support changes in instance types, bandwidth, and billing methods, and do not support automatic recovery upon host failures.
• The associations of instances to local disks are fixed. The number and capacity of local disks of an instance are based on the instance type. Instances with local SSDs are bound to their local disks. You cannot attach additional local disks to these instances or detach local disks from these instances and attach the disks to another instance.
• You cannot create snapshots 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 using the snapshots of both the system disk and data disks (data disks must be non-local disks).
• You cannot create images that contain system disks and data disks based on instance IDs.
• You can attach a standard SSD to an instance with local SSDs. The capacity of the standard SSD is scalable.
• Operations on an instance with local SSDs may affect the data stored on the local disks. For more information, see #unique_82/unique_82_Connect_42_section_vdp_m2w_ydb.

Best practices for mounting a file system on a big data instance

You must initialize the inode table when you mount a file system such as ext4 for the first time. By default, the lazyinit feature is enabled in Linux kernel V2.6.37 and later. In this case, the inode table is not initialized until the file system is mounted. In addition, local disks require a large amount of throughput during initialization. For example, the throughput of 30 local disks may reach 600 MB/s. This affects service stability. The concurrency of lazyinit in Linux kernel V4.x is improved to solve this problem. For more information, visit index: kernel/git/stable/linux.git. We recommend that you use the following best practices to initialize the inode table at your earliest convenience.
1. Obtain a list of all local SATA HDDs.

2. Run the following command to enable separate initialization for each local disk:

   In this example, an ext4 file system is created on a local disk named /dev/vdb.

   ```bash
   mkfs.ext4 -E lazy_itable_init=0,lazy_journal_init=0 /dev/vdb &
   ```

3. After all local disks are initialized, run the `iostat -x 5` command until the I/O activity of all local disks is displayed as 0.

4. Run the mount command in batches.

### d2s, storage intensive big data instance family

Features:

- I/O-optimized.
- Supports enhanced SSDs, standard SSDs, and ultra disks.
- High-capacity local SATA HDDs with high throughput and a maximum of 35 Gbit/s bandwidth among instances.
- Supports online replacement and hot swapping of damaged disks to avoid instance shutdown.

   If a local disk fails, you will receive a notification about the system event. You can respond to the system event by initiating the process to fix the damaged disk. For more information, see [#unique_81](#unique_81).

   - If a backup disk is available on the physical machine, Alibaba Cloud will replace the damaged disk with the backup disk online.
   - If no backup disk is available on the physical machine, the disk hardware must be replaced manually before Alibaba Cloud can replace the damaged disk.

**Notice:**

After you have started the process to fix the damaged disk, data in the damaged disk cannot be recovered.

- Equipped with 2.5 GHz Intel *Xeon* Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - Big data computing and storage business scenarios that use Hadoop MapReduce, HDFS, Hive, and HBase
  - Machine learning scenarios such as in-memory computing with Spark and scalable machine learning with MLlib
  - Search and log data processing scenarios that use solutions such as Elasticsearch and Kafka

### 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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<tbody>
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<td>8 × 7, 300</td>
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<td>15 × 7, 300</td>
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<td>30 × 7, 300</td>
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<td>4,500</td>
<td>Yes</td>
<td>32</td>
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<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 specifications.

**d1ne, big data instance family with enhanced network performance**

Features:

- I/O optimized.
- Supports standard SSDs and ultra disks.
- High-capacity local SATA HDDs with high throughput and a maximum of 35 Gbit/s bandwidth among instances.
- Offers a CPU-to-memory ratio of 1:4, which is designed for big data scenarios.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios that use Hadoop MapReduce, HDFS, Hive, and HBase
  - Machine learning scenarios such as in-memory computing with Spark and scalable machine learning with MLlib
  - Use of solutions such as Elasticsearch for log 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>6.0</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 specifications](#).

**d1, big data instance family**

Features:

- I/O optimized.
- Supports standard SSDs and ultra disks.
- High-capacity local SATA HDDs with high throughput and up to 17 Gbit/s of bandwidth among instances.
- Offers a CPU-to-memory ratio of 1:4, which is designed for big data scenarios.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios that use Hadoop MapReduce, HDFS, Hive, and HBase
  - Machine learning scenarios such as in-memory computing with Spark and scalable machine learning with MLlib
  - Suitable for customers in Internet, finance, and other industries that need to compute, store, and analyze big data
  - Use of solutions such as Elasticsearch for log data processing

Instance types
<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
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<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<td>1,000</td>
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<tr>
<td>ecs.d1.14xlarge</td>
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<td>224.0</td>
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<td>17.0</td>
<td>1,800</td>
<td>No</td>
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**Note:**

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- For more information about these specifications, see [Instance specifications](#).
4.5 Instance families with local SSDs

This topic describes the features of ECS instance families with local SSDs and lists the instance types of each family.

- **Recommended instance families**
  - i2, instance family with local SSDs
  - i2g, instance family with local SSDs
  - i2ne, instance family with local SSDs
  - i2gne, instance family with local SSDs

- **Other available instance families**
  - i1, instance family with local SSDs

**Instruction**

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) data warehouses, and distributed file systems.

Instances with local SSDs are suitable for enterprises that provide online services such as online gaming, e-commerce, live video streaming, and media. Instances with local SSDs can satisfy the high requirements of I/O-intensive applications that require low latency and high I/O performance of block storage.

Instances with local SSDs have the following features:

- Provide up to hundreds of thousands of low latency random read/write IOPS for large databases.
- Offer a maximum throughput of several gibabytes per second for sequential read/write operations in big data, parallel computing, and other large dataset scenarios.
- Use local NVMe SSDs to deliver hundreds of thousands of random read/write IOPS with only several microseconds of latency.

When you use instances with local SSDs, take note of the following items:

- Instances with local SSDs do not support changes in instance types, bandwidth, and billing methods, and do not support automatic recovery upon host failures.
- The associations of instances to local disks are fixed. The number and capacity of local disks of an instance are based on the instance type. Instances with local SSDs are bound
Elastic Compute Service

Instance / 4 Instance type families

to their local disks. You cannot attach additional local disks to these instances or detach local disks from these instances and attach the disks to another instance.

- You cannot create snapshots 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 using the snapshots of both the system disk and data disks (data disks must be non-local disks).
- You cannot create images that contain system disks and data disks based on instance IDs.
- You can attach a standard SSD to an instance with local SSDs. The capacity of the standard SSD is scalable.
- Local disks are attached to a single physical server, which increases the risk of single point of failure (SPOF). The reliability of data stored on local disks depends on the reliability of the physical server.

⚠️ Warning:

For example, data stored on local disks may be lost when a hardware failure occurs. We recommend that you do not use local disks for long-term data storage.

- To ensure data availability, we recommend that you implement data redundancy at the application layer. You can use deployment sets to distribute ECS instances across multiple physical machines to achieve high availability and disaster recovery. For more information, see #unique_93.
- If your applications do not have data reliability architecture, we recommend that you use cloud disks or the backup service in your ECS instances for data reliability. For more information, see #unique_94 or #unique_95.

- Operations on an instance with local SSDs may affect the data stored on the local disks. For more information, see #unique_82/unique_82_Connect_42_section_vdp_m2w_ydb.

### i2, instance family with local SSDs

**Features**

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
- Offers a CPU-to-memory ratio of 1:8, which is designed for high-performance databases.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Online transaction processing (OLTP) and high-performance relational databases
  - NoSQL databases such as Cassandra, MongoDB, and HBase
  - Search scenarios that use solutions such as Elasticsearch

## 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 forward 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>
<th>Disk bandwidth (Gbit/s)</th>
</tr>
</thead>
<tbody>
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<td>1 × 894</td>
<td>1.0</td>
<td>500</td>
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<td>2</td>
<td>3</td>
<td>10</td>
<td>Up to 16</td>
</tr>
<tr>
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<td>64.0</td>
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<td>2.0</td>
<td>1,000</td>
<td>Yes</td>
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<td>4</td>
<td>10</td>
<td>Up to 16</td>
</tr>
<tr>
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<td>128.0</td>
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<td>3.0</td>
<td>1,500</td>
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<td>8</td>
<td>20</td>
<td>Up to 16</td>
</tr>
<tr>
<td>ecs.i2.8xlarge</td>
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<td>2,000</td>
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<td>8</td>
<td>20</td>
<td>Up to 16</td>
</tr>
<tr>
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<td>10.0</td>
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<td>16</td>
<td>8</td>
<td>20</td>
<td>Up to 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 specifications](#).
- For more information about the performance metrics of SSDs, see [#unique_82](#).

**i2g, instance family with local SSDs**

Features
• I/O optimized.
• Supports standard SSDs and ultra disks.
• Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
• Offers a CPU-to-memory ratio of 1:4, which is designed for high-performance databases.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
• Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - OLTP and high-performance relational databases
  - NoSQL databases such as Cassandra, MongoDB, and HBase
  - Search scenarios that use solutions such as Elasticsearch

### 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>2</td>
<td>4</td>
<td>10</td>
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<tr>
<td>ecs.i2g. 4xlarge</td>
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<td>3.0</td>
<td>1,500</td>
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<td>4</td>
<td>8</td>
<td>20</td>
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<tr>
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<td>2 × 1,788</td>
<td>6.0</td>
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**Note:**

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- For more information about these specifications, see [Instance specifications](#).
- For more information about the performance metrics of SSDs, see #unique_82.
Elastic Compute Service

Instance / 4 Instance type families

**i2ne, instance family with local SSDs**

i2ne is under invitational preview. To use i2ne, submit a ticket.

Features

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
- Provides a bandwidth of up to 20 Gbit/s.
- Offers a CPU-to-memory ratio of 1:8, which is designed for high-performance databases.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - OLTP and high-performance relational databases
  - NoSQL databases such as Cassandra, MongoDB, and HBase
  - Search scenarios that use solutions such as Elasticsearch

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<th>ENIs (including one primary ENI)</th>
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<th>Disk bandwidth (Gbit/s)</th>
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</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 forwarding rate (Kpps)</td>
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**Note:**
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- For more information about the specifications, see [Instance specifications](#).
- For more information about the performance metrics of SSDs, see [#unique_82](#).

**i2gne, instance family with local SSDs**

i2gne is under invitational preview. To use i2gne, [submit a ticket](#).

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
- Provides a bandwidth of up to 20 Gbit/s.
- Offers a CPU-to-memory ratio of 1:4, which is designed for high-performance databases.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - OLTP and high-performance relational databases
  - NoSQL databases such as Cassandra, MongoDB, and HBase
  - Search scenarios that use solutions such as Elasticsearch
### Instance types

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<th>Instance type</th>
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- For more information about these specifications, see [Instance specifications](#).
- For more information about the performance metrics of SSDs, see [#unique_82](#).

**i1, instance family with local SSDs**

**Features**

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Attached with high-performance local NVMe SSDs that feature high IOPS, high I/O throughput, and low latency.
- Offers a CPU-to-memory ratio of 1:4, which is designed for high-performance databases.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - OLTP and high-performance relational databases
  - NoSQL databases such as Cassandra and MongoDB
  - Search scenarios that use solutions such as Elasticsearch

### 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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**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 specifications](#).
4.6 Instance families with high clock speed

This topic describes the features of instance families with high clock speed and lists the instance types of each family.

- **Recommended instance families**
  - 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

- **Other available instance families**
  - hfc5, compute optimized instance family with high clock speed
  - hfg5, general purpose instance family with high clock speed

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

**Features**

- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks.
- Provides high storage I/O performance based on large computing capacity.

**Note:**

For more information about the storage I/O performance of the new generation of enterprise-level instance families, see #unique_86.

- Offers a CPU-to-memory ratio of 1:2.
- Provides an ultra high packet forwarding rate.
- Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake) processors that can be overclocked to 3.5 GHz.

**Note:**

The CPU of this instance family provides a 3.1 GHz clock speed. The Intel System Studio (ISS) feature may cause a lower clock speed to be displayed. Alibaba Cloud is trying
to fix the display problem. The problem does not affect the actual clock speed of your instances.

- Allows you to enable or disable Hyper-Threading.

**Note:**
By default, Hyper-Threading is enabled on ECS instances. For more information, see [Customize CPU options](#).

- Provides a fast and reliable network based on large computing capacity.

- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Web frontend servers
  - Frontend servers of massively multiplayer online (MMO) games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
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<td>200</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 specifications](#).

**hfg6, general purpose instance family with high clock speed**

**Features**
- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
• Supports ESSDs, standard SSDs, and ultra disks.

• Provides high storage I/O performance based on large computing capacity.

Note:
For more information about the storage I/O performance of the new generation of enterprise-level instance families, see #unique_86.

• Offers a CPU-to-memory ratio of 1:4.

• Provides an ultra high packet forwarding rate.

• Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake) processors that can be overclocked to 3.5 GHz.

Note:
The CPU of this instance family provides a 3.1 GHz clock speed. The Intel System Studio (ISS) feature may cause a lower clock speed to be displayed. Alibaba Cloud is trying to fix the display problem. The problem does not affect the actual clock speed of your instances.

• Allows you to enable or disable Hyper-Threading.

Note:
By default, Hyper-Threading is enabled on ECS instances. For more information, see Customize CPU options.

• Provides a fast and reliable network based on large computing capacity.

• Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - Enterprise-grade applications of various types and sizes
  - Websites 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>Base bandwidth (Gbit/s)</th>
<th>Burstable bandwidth (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queue</th>
<th>ENIs (including primary ENI)</th>
<th>Privat IP address per ENI</th>
<th>Disk IOPS (K)</th>
<th>Disk bandwidth (Gbit/s)</th>
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<td>4.0</td>
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Elastic Compute Service

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 the specifications, see Instance specifications.

hfr6, memory optimized instance family with high clock speed

Features

- Provides predictable and consistent high performance and reduces virtualization overheads with the use of the X-Dragon architecture.
- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Provides high storage I/O performance based on large computing capacity.

Note:
For more information about the storage I/O performance of the new generation of enterprise-level instance families, see #unique_86.

- Offers a CPU-to-memory ratio of 1:8.
- Provides an ultra high packet forwarding rate.
- Equipped with 3.1 GHz Intel® Xeon® Platinum 8269 (Cascade Lake) processors that can be overclocked to 3.5 GHz.

Note:
The CPU of this instance family provides a 3.1 GHz clock speed. The Intel System Studio (ISS) feature may cause a lower clock speed to be displayed. Alibaba Cloud is trying to fix the display problem. The problem does not affect the actual clock speed of your instances.

- Allows you to enable or disable Hyper-Threading.

Note:
By default, Hyper-Threading is enabled on ECS instances. For more information, see Customize CPU options.

- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Scenarios where large volumes of packets are received and transmitted, such as video live chat and telecom data forwarding
  - High-performance and in-memory databases
  - Data analysis, data mining, and distributed memory caching
  - Hadoop clusters, Spark clusters, and other memory intensive enterprise applications

### 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>
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<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
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<td>32</td>
<td>15</td>
<td>20</td>
<td>200</td>
<td>16.0</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 specifications](#).

**hfc5, compute optimized instance family with high clock speed**

**Features**
- I/O optimized.
- Supports standard SSDs and ultra disks.
- Provides consistent computing performance.
- Equipped with 3.1 GHz Intel® Xeon® Gold 6149 (Skylake) processors.
- Offers a CPU-to-memory ratio of 1:2.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - High-performance web frontend servers
  - High-performance scientific and engineering applications
  - MMO gaming and video coding
### 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>
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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 specifications](#).

**hfg5, general purpose instance family with high clock speed**

**Features**

- I/O optimized.
• Supports standard SSDs and ultra disks.
• Provides consistent computing performance.
• Equipped with 3.1 GHz Intel® Xeon® Gold 6149 (Skylake) processors.
• Offers a CPU-to-memory ratio of 1:4 (excluding the instance type with 56 vCPUs).
• Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - High-performance web frontend servers
  - High-performance scientific and engineering applications
  - MMO gaming and video coding

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>
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<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<td>300</td>
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<td>6</td>
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<tr>
<td>ecs. hfg5. xlarge</td>
<td>4</td>
<td>16.0</td>
<td>None</td>
<td>1.5</td>
<td>500</td>
<td>No</td>
<td>2</td>
<td>3</td>
<td>10</td>
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<td>32.0</td>
<td>None</td>
<td>2.0</td>
<td>1,000</td>
<td>No</td>
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<td>1,300</td>
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<td>10</td>
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<td>ecs. hfg5. 4xlarge</td>
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<td>64.0</td>
<td>None</td>
<td>3.0</td>
<td>1,600</td>
<td>No</td>
<td>4</td>
<td>8</td>
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<td>ecs. hfg5. 6xlarge</td>
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<td>2,000</td>
<td>No</td>
<td>6</td>
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</table>
### 4.7 Compute optimized type family with GPU

#### 4.7.1 Compute optimized instance families with GPU capabilities

This topic describes the features of compute optimized instance families with GPU capabilities and lists the instance types of each family.

- **Recommended instance families**
  - vgn6i, lightweight compute optimized instance family with GPU capabilities
  - gn6i, compute optimized instance family with GPU capabilities
  - gn6e, compute optimized instance family with GPU capabilities
  - gn6v, compute optimized instance family with GPU capabilities

- **Other available instance families**
  - vgn5i, lightweight 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

---

<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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<tbody>
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<td>8</td>
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<td>10.0</td>
<td>4,000</td>
<td>No</td>
<td>14</td>
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</table>
vgn6i, lightweight compute optimized instance family with GPU capabilities

vgn6i is under invitational preview. To use vgn6i, submit a ticket.

Features

• I/O optimized.
• Supports standard SSDs and ultra disks.
• Uses NVIDIA T4 GPU computing accelerators.
• Contains virtual GPUs (vGPUs), which are the result of GPU virtualization with mediated pass-through.
  - Supports the 1/8, 1/4, and 1/2 computing capacity of NVIDIA® Tesla® T4 GPUs.
  - Supports 2, 4, and 8 GB of GPU memory.
• Offers a CPU-to-memory ratio of 1:5.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
• Provides a fast and reliable network based on 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>GPUs</th>
<th>GPU memory (GB)</th>
<th>Bandwidth (Gbit /s)</th>
<th>Packet forward rate (Kpps)</th>
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<td>23.0</td>
<td>None</td>
<td>1/4 x T4</td>
<td>4</td>
<td>3.0</td>
<td>500</td>
<td>Yes</td>
<td>2</td>
<td>4</td>
<td>10</td>
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<tr>
<td>Instance type</td>
<td>vCPUs</td>
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<td>Local storage (GiB)</td>
<td>GPUs</td>
<td>GPU memory (GB)</td>
<td>Bandwidth (Gbit/s)</td>
<td>Packet forwarding 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>
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<td>-----------</td>
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<tr>
<td>ecs. vgn6i-m8.2xlarge</td>
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<td>46.0</td>
<td>None</td>
<td>1/2 × T4</td>
<td>8</td>
<td>4.0</td>
<td>800</td>
<td>Yes</td>
<td>4</td>
<td>5</td>
<td>20</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 specifications.

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

**Features**
- I/O optimized.
- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Supports enhanced SSDs (ESSDs) that deliver millions of IOPS, standard SSDs, and ultra disks.
- Uses NVIDIA T4 GPU computing accelerators.
  - Powered by the new NVIDIA Turing architecture.
  - 16 GB GPU memory (320 GB/s bandwidth).
  - 2,560 CUDA cores per GPU.
  - Up to 320 Turing Tensor cores.
  - Mixed-precision Tensor cores support 65 FP16 TFLOPS, 130 INT8 TOPS, and 260 INT4 TOPS.
- Provides a fast and reliable network based on large computing capacity.
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Instance / 4 Instance type families

- 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</th>
<th>GPU memory (GB)</th>
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<td>15.0</td>
<td>None</td>
<td>1 x T4</td>
<td>16</td>
<td>4.0</td>
<td>500</td>
<td>Yes</td>
<td>2</td>
<td>2</td>
<td>10</td>
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<tr>
<td>ecs.gn6i-c8g1.2xlarge</td>
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<td>31.0</td>
<td>None</td>
<td>1 x T4</td>
<td>16</td>
<td>5.0</td>
<td>800</td>
<td>Yes</td>
<td>2</td>
<td>2</td>
<td>10</td>
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<td>6.0</td>
<td>1,000</td>
<td>Yes</td>
<td>4</td>
<td>3</td>
<td>10</td>
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<td>Yes</td>
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### Elastic Compute Service

#### Instance Type / 4 Instance type families

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<th>GPU memory (GB)</th>
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<td>2,400</td>
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<td>12</td>
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<td>4 × T4</td>
<td>64</td>
<td>30.0</td>
<td>4,800</td>
<td>Yes</td>
<td>24</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 specifications](#).

#### gn6e, compute optimized instance family with GPU capabilities

**Features**
- I/O optimized.
- Supports ESSDs, standard SSDs, and ultra disks.
- Uses NVIDIA V100 (32 GB NVLink) GPU processors.
- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
- Uses NVIDIA V100 GPU computing accelerators that have the SXM2 module.
  - Powered by the new NVIDIA Volta architecture.
  - 32 GB HBM2 GPU memory (900 GB/s bandwidth).
  - 5,120 CUDA cores per GPU.
  - 640 Tensor cores per GPU.
  - Supports up to six NVLink connections and a total bandwidth of 300 GB/s (25 GB/s per connection).
- Provides a fast and reliable network 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 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>GPUs</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>
<th>Private IP addresses per ENI</th>
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<td>12</td>
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<td>None</td>
<td>1 x V100</td>
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<td>4,800</td>
<td>Yes</td>
<td>16</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 specifications.

gn6v, compute optimized instance family with GPU capabilities

Features
• I/O optimized.
• Supports ESSDs, standard SSDs, and ultra disks.
• Uses NVIDIA V100 GPU processors.
• Offers a CPU-to-memory ratio of 1:4.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
• Uses NVIDIA V100 GPU computing accelerators that have the SXM2 module.
  - Powered by the new NVIDIA Volta architecture.
  - 16 GB HBM2 GPU memory (900 GB/s bandwidth).
  - 5,120 CUDA cores per GPU.
  - 640 Tensor cores per GPU.
  - Supports up to six NVLink connections and a total bandwidth of 300 GB/s (25 GB/s per connection).
• Provides a fast and reliable network 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 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>GPUs</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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<td>4</td>
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<td>10</td>
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<tr>
<td>ecs.gn6v-cbg1.8xlarge</td>
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<td>128.0</td>
<td>None</td>
<td>4×NVIDIA V100</td>
<td>4×16</td>
<td>10.0</td>
<td>2,000</td>
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## Elastic Compute Service

<table>
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<td>8 x 16</td>
<td>32.0</td>
<td>4,500</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 these specifications, see [Instance specifications](#).

**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.
- Offers a CPU-to-memory ratio of 1:3.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on 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>GPUs</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>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. vgn5i-m1.large</td>
<td>2</td>
<td>6.0</td>
<td>None</td>
<td>1/8 × P4</td>
<td>1</td>
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<td>300</td>
<td>Yes</td>
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<tr>
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<td>12.0</td>
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<td>1/4 × P4</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>
<td>ecs. vgn5i-m4.2xlarge</td>
<td>8</td>
<td>24.0</td>
<td>None</td>
<td>1/2 × P4</td>
<td>4</td>
<td>3.0</td>
<td>800</td>
<td>Yes</td>
<td>2</td>
<td>4</td>
<td>10</td>
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<tr>
<td>ecs. vgn5i-m8.4xlarge</td>
<td>16</td>
<td>48.0</td>
<td>None</td>
<td>1 × P4</td>
<td>8</td>
<td>5.0</td>
<td>1,000</td>
<td>Yes</td>
<td>4</td>
<td>5</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 specifications.
gn5, compute optimized instance family with GPU capabilities

Features

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Uses NVIDIA P100 GPU processors.
- Offers multiple CPU-to-memory ratios.
- Attached with high-performance local NVMe SSDs.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Deep learning
  - Scientific computing applications, such as fluid dynamics, finance, genomics, and environmental analysis
  - Server-side GPU compute workloads such as high-performance computation, rendering, and multi-media coding and decoding

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 (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
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<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
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<tbody>
<tr>
<td>ecs. gn5-c4g1.xlarge</td>
<td>4</td>
<td>30.0</td>
<td>440</td>
<td>1 × NVIDIA P100</td>
<td>1 × 16</td>
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<td>300</td>
<td>No</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>ecs. gn5-c8g1.2xlarge</td>
<td>8</td>
<td>60.0</td>
<td>440</td>
<td>1 × NVIDIA P100</td>
<td>1 × 16</td>
<td>3.0</td>
<td>400</td>
<td>No</td>
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<td>10</td>
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<tr>
<td>ecs. gn5-c4g1.2xlarge</td>
<td>8</td>
<td>60.0</td>
<td>880</td>
<td>2 × NVIDIA P100</td>
<td>2 × 16</td>
<td>5.0</td>
<td>1,000</td>
<td>No</td>
<td>2</td>
<td>4</td>
<td>10</td>
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</table>
### Elastic Compute Service

<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 (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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<tbody>
<tr>
<td>ecs. gn5-c8g1.4xlarge</td>
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<td>2 × NVIDIA P100</td>
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<td>No</td>
<td>8</td>
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<td>20</td>
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<td>ecs. gn5-c8g1.8xlarge</td>
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<td>No</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>
<td>2 × 16</td>
<td>10.0</td>
<td>2,000</td>
<td>No</td>
<td>14</td>
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<td>4,000</td>
<td>No</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 specifications](#).

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

**Features**

- I/O optimized.
- Supports standard SSDs and ultra disks.
• Uses NVIDIA P4 GPU processors.
• Offers a CPU-to-memory ratio of 1:4.
• Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
• Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - Deep learning and inference
  - Server-side GPU compute workloads such as multimedia encoding and decoding

### 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 (Gbit/s)</th>
<th>Packet forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues</th>
<th>ENIs (includes one primary ENI)</th>
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<tr>
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<td>2</td>
<td>8.0</td>
<td>None</td>
<td>1 x NVIDIA P4</td>
<td>1 x 8</td>
<td>1.0</td>
<td>100</td>
<td>Yes</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.g5i-c4g1.xlarge</td>
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<td>16.0</td>
<td>None</td>
<td>1 x NVIDIA P4</td>
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<td>200</td>
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<td>2</td>
<td>3</td>
<td>10</td>
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<tr>
<td>ecs.g5i-c8g1.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<td>1 x NVIDIA P4</td>
<td>1 x 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>
<td>ecs.g5i-c16g1.4xlarge</td>
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<td>64.0</td>
<td>None</td>
<td>1 x NVIDIA P4</td>
<td>1 x 8</td>
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<td>Yes</td>
<td>4</td>
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<tr>
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<td>1,200</td>
<td>Yes</td>
<td>8</td>
<td>8</td>
<td>20</td>
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</tbody>
</table>
### Elastic Compute Service

#### 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>GPUs</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>
<th>Private IP addresses per ENI</th>
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</thead>
<tbody>
<tr>
<td>ecs. gn5i-c28g1.14xlarge</td>
<td>56</td>
<td>224.0</td>
<td>None</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 specifications](#).

**gn4, compute optimized family with GPU capabilities**

Features

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Uses NVIDIA M40 GPU processors.
- Offers multiple CPU-to-memory ratios.
- Equipped with 2.5 GHz Intel ® Xeon ® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Deep learning
  - Scientific computing applications, such as fluid dynamics, finance, genomics, and environmental analysis
  - Server-side GPU compute workloads such as high-performance computation, rendering, and multi-media coding and decoding
<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 (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. gn4-c4g1.xlarge</td>
<td>4</td>
<td>30.0</td>
<td>None</td>
<td>1×</td>
<td>NVIDIA M40</td>
<td>1.0</td>
<td>3.0</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>None</td>
<td>1×</td>
<td>NVIDIA M40</td>
<td>1.0</td>
<td>3.0</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>None</td>
<td>1×</td>
<td>NVIDIA M40</td>
<td>1.0</td>
<td>6.0</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>None</td>
<td>2×</td>
<td>NVIDIA M40</td>
<td>2.0</td>
<td>5.0</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>None</td>
<td>2×</td>
<td>NVIDIA M40</td>
<td>2.0</td>
<td>5.0</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>None</td>
<td>2×</td>
<td>NVIDIA M40</td>
<td>2.0</td>
<td>10.0</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 specifications.

### 4.7.2 Create a compute optimized instance with GPU capabilities

You must install the GPU driver to use a compute optimized instance with GPU capabilities. You can choose whether to install the GPU driver when you create an instance, or manually
install the driver after the instance is created. This topic describes how to create a compute optimized instance with GPU capabilities and install the driver during the creation process.

Context

If you choose to install the driver when you create the instance, take note of the following items:

- The GPU driver can only be installed on instances that run Linux public images.
- The automatic installation script has been updated to V2.1. It can be used in the automatic installation of different versions of GPU drivers, CUDA, and CUDA Deep Neural Network (cuDNN) libraries.
- Depending on the internal bandwidth and the number of CPUs of the specific instance type, the automatic installation process requires 10 to 15 minutes. The GPU cannot be used during the installation process. Do not perform any operation on the instance or install other GPU-related software. Otherwise, the automatic installation may fail, causing the instance to become unavailable.
- If you change the operating system after you create the instance, ensure that you use the same image or an image that can automatically install the CUDA and GPU drivers to prevent failure in automatic installation. For more information, see Images supporting automatic installation of CUDA and GPU drivers.
- You can connect to the instance and view the installation progress and result in the installation log:
  - If the installation is in progress, you can see the installation progress bar.
  - If the installation succeeds, **NVIDIA INSTALL OK** is displayed.
  - If the installation fails, **NVIDIA INSTALL FAIL** is displayed.
  - The storage path for detailed installation logs is /root/nvidia/nvidia_install.log.

Procedure

This procedure focuses on the configurations related to compute optimized instances with GPU capabilities. For more information about general configurations, see Create an instance by using the provided wizard.

1. Go to the **ECS buy page**.
2. Perform the following steps to complete **Basic Configurations**. When you configure parameters, note that:

- **Region**: Select the region and zone based on the following table. The following table is for reference only. The actual prices on the buy page will prevail in the case the information is inconsistent.

The following table lists the regions and zones that provide compute optimized instance families with GPU capabilities.

<table>
<thead>
<tr>
<th>Instance type</th>
<th>Zone</th>
</tr>
</thead>
</table>
| gn4           | - Beijing Zone A and Shanghai Zone B  
               - Shenzhen Zone B and Shenzhen Zone C |
| gn5           | - Beijing Zone C, Beijing Zone D, Beijing Zone G, Zhangjiakou (Beijing Winter Olympics) Zone A, Zhangjiakou Zone B, and Hohhot Zone A  
               - Hangzhou Zone F, Hangzhou Zone G, Hangzhou Zone I, Shanghai Zone B, Shanghai Zone D, Shanghai Zone E, and Shanghai Zone F  
               - Shenzhen Zone A, Shenzhen Zone B, Shenzhen Zone C, Shenzhen Zone D, and Shenzhen Zone E  
               - Hongkong Zone B and Hongkong Zone C  
               - Singapore Zone A, Singapore Zone B, Sydney Zone A, Sydney Zone B, Kuala Lumpur Zone A, Kuala Lumpur Zone B, and Jakarta Zone A  
               - Tokyo Zone A and Tokyo Zone B  
               - Silicon Valley Zone A, Silicon Valley Zone B, Virginia Zone A, and Virginia Zone B  
               - Frankfurt Zone A and Frankfurt Zone B  
               - Mumbai Zone A |
| gn5i          | - Beijing Zone C, Beijing Zone E, Beijing Zone G, Zhangjiakou (Beijing Winter Olympics) Zone A, and Zhangjiakou Zone B  
               - Hangzhou Zone B, Hangzhou Zone G, Shanghai Zone D, and Shanghai Zone E  
               - Shenzhen Zone A, Shenzhen Zone C, Shenzhen Zone D, and Shenzhen Zone E |
Instance type | Zone
--- | ---
**gn6v** | - Beijing Zone G, Beijing Zone H, Zhangjiakou (Beijing Winter Olympics) Zone A, and Zhangjiakou Zone B
- Hangzhou Zone H, Hangzhou Zone I, and Shanghai Zone F
- Shenzhen Zone E
- Silicon Valley Zone B

**gn6i** | - Hangzhou Zone H, Shanghai Zone F, and Shanghai Zone G
- Shenzhen Zone E
- Singapore Zone C

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

- **Image:** Some public images support the automatic installation of the GPU driver. You can also select an image pre-installed with the GPU driver and related software by clicking Marketplace Image.

**Note:**
If you select Shared Image or Custom Image, make sure that the selected image is pre-installed with the required GPU driver and software.

- Public images are basic system images provided by Alibaba Cloud or its third-party partners. The following public images support the automatic installation of GPU drivers:
  - CentOS 64-bit images that are applied and tested by Alibaba Cloud
  - Ubuntu 16.04 64-bit images
  - Ubuntu 18.04 64-bit images
  - SUSE Linux Enterprise Server 12 SP2 64-bit images

If you select an image that supports the automatic installation of the GPU driver, select **Auto-install GPU Driver**, and select the versions of GPU driver, CUDA, and cuDNN library. If you want to create an instance for a new business system, we recommend that you select the latest version.

For images that support the automatic installation of the GPU driver, if you do not select **Auto-install GPU Driver**, you can configure the installation script in the **User**
Data module. For more information about the installation script, see Automatic installation script V2.1.

If you do not select Auto-install GPU Driver or the image does not support the automatic installation of the GPU driver, you can manually install the GPU driver after you create an instance. For more information, see Install the GPU driver.

Note:
If you call the RunInstances operation to create a compute optimized instance with GPU capabilities, you must use the UserData parameter to upload the installation script. The script content must be Base64-encoded.

- Alibaba Cloud Marketplace provides images with operating systems, application environments, and various software pre-installed. Marketplace images are reviewed by Alibaba Cloud to ensure quality and stability. You can deploy ECS instances with one click without any configuration for the instance. Alibaba Cloud Marketplace provides images that support deep learning and machine learning:
  - If you decide to use the compute optimized instance with GPU capabilities in deep learning, you can select an image with deep learning software pre-installed. You can use the keywords deep learning to search for available images on Alibaba Cloud Marketplace. Only CentOS 7.3 is supported.
  - The NVIDIA GPU Cloud VM Image is an optimized environment for running the deep learning software, HPC applications, and HPC visualization tools available from the NVIDIA GPU Cloud (NGC) container registry. Instance families gn5, gn5i, gn6v, and gn6i support NGC. For more information, see #unique_101.
3. Complete the **Networking** configurations. When you configure parameters, note that:

- **Network Type**: Select VPC.
- **Public IP Address**: Select a bandwidth based on your business needs.

**Notice:**
If you select an image of Windows 2008 R2 or earlier in **Basic Configurations**, you cannot connect to the compute optimized instance with GPU capabilities through the management terminal after the GPU driver is installed and takes effect. When you connect to the instance, a black screen or the startup interface persists. You need to select **Assign Public IP Address** in the Public IP Address section, or bind an Elastic IP Address after you create the instance to connect to the instance over other protocols, such as RDP (Remote Desktop in Windows), PCOIP, and XenDesktop HDX 3D. RDP does not support applications such as DirectX and OpenGL. You need to install the VNC service and client.

4. Complete the **System Configurations**. When you configure parameters, note that:

- **Logon Credentials**: We recommend you select **Key Pair** or **Password**. If you select **Set Later**, to log on to the instance through the management terminal, you must bind an SSH key pair or reset the password and then restart the instance for the modification
to take effect. If you have not installed the GPU driver, restarting the instance will cause the installation to fail.

- **User Data:**
  - If you select **Auto-install GPU Driver** in the **Image** section on the **Basic Configurations** page, the precautions and shell script content for automatically installing CUDA and the GPU driver will be displayed in the User Data section.
  - If you do not select **Auto-install GPU Driver**, you can configure the installation script in **User Data**. For information about a script example, see **Automatic installation script V2.1**.

5. Complete the **Grouping** configurations and confirm your order on the **Preview** page to complete the creation of a compute optimized instance with GPU capabilities.

**Note:**

- If you configured the automatic installation script, the instance automatically installs the GPU driver after the instance is started. After the GPU driver is installed, the instance will automatically restart and the GPU will become operational.
- The GPU driver works more stably in the Persistence Mode. The installation script enables Persistence Mode by default and adds this setting to the Linux service. This setting ensures Persistence Mode is enabled by default next time the instance is started.

**Automatically install the GPU driver script**

When the instance is started for the first time, cloud-init automatically runs the shell script to install the GPU driver, CUDA, and cuDNN library.
- If you select **Auto-install GPU Driver**, the following versions of GPU driver, CUDA, and cuDNN library are available.

<table>
<thead>
<tr>
<th>CUDA</th>
<th>GPU driver</th>
<th>cuDNN</th>
<th>Supported instance family</th>
<th>Supported public image version (Only images that are applied and tested by Alibaba Cloud are supported)</th>
</tr>
</thead>
<tbody>
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<td>418.67</td>
<td>7.5.0</td>
<td>- gn5</td>
<td>- Ubuntu 18.04</td>
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<tr>
<td></td>
<td>- 410.104</td>
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<td>- gn5i</td>
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<td></td>
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<td>- gn6v</td>
<td>- CentOS 7.x</td>
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<td></td>
<td>- gn4</td>
<td>- CentOS 6.x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- gn6i</td>
<td>- SUSE 12SP2</td>
</tr>
<tr>
<td>10.0.130</td>
<td>- 418.67</td>
<td>- 7.5.0</td>
<td>- gn5</td>
<td>- Ubuntu 18.04</td>
</tr>
<tr>
<td></td>
<td>- 410.104</td>
<td>- 7.4.2</td>
<td>- gn5i</td>
<td>- Ubuntu 16.04</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 7.3.1</td>
<td>- gn6v</td>
<td>- CentOS 7.x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- gn4</td>
<td>- CentOS 6.x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- gn6i</td>
<td>- SUSE 12SP2</td>
</tr>
<tr>
<td>9.2.148</td>
<td>- 418.67</td>
<td>- 7.5.0</td>
<td>- gn5</td>
<td>- Ubuntu 16.04</td>
</tr>
<tr>
<td></td>
<td>- 410.104</td>
<td>- 7.4.2</td>
<td>- gn5i</td>
<td>- CentOS 7.x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 7.3.1</td>
<td>- gn6v</td>
<td>- CentOS 6.x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- gn4</td>
<td>- SUSE 12SP2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- gn6i</td>
<td></td>
</tr>
<tr>
<td>9.0.176</td>
<td>- 418.67</td>
<td>- 7.5.0</td>
<td>- gn5</td>
<td>- Ubuntu 16.04</td>
</tr>
<tr>
<td></td>
<td>- 410.104</td>
<td>- 7.4.2</td>
<td>- gn5i</td>
<td>- CentOS 7.x</td>
</tr>
<tr>
<td></td>
<td>- 390.116</td>
<td>- 7.3.1</td>
<td>- gn6v</td>
<td>- CentOS 6.x</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 7.1.4</td>
<td>- gn4</td>
<td>- SUSE 12SP2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- gn6i</td>
<td></td>
</tr>
<tr>
<td>8.0.61</td>
<td>- 418.67</td>
<td>- 7.1.3</td>
<td>- gn5</td>
<td>- Ubuntu 16.04</td>
</tr>
<tr>
<td></td>
<td>- 410.104</td>
<td>- 7.0.5</td>
<td>- gn5i</td>
<td>- CentOS 7.x</td>
</tr>
<tr>
<td></td>
<td>- 390.116</td>
<td>- 7.0.5</td>
<td>- gn4</td>
<td>- CentOS 6.x</td>
</tr>
</tbody>
</table>
• If you configure the installation script in the User Data section, see Automatic installation script V2.1 for the script content.

The automatic installation script V2.1 has the following benefits:

- Provides the latest CUDA, GPU driver, and cuDNN library.
- After you log on to the instance, if the GPU driver is being installed, you can see the installation progress bar. If the installation succeeds, NVIDIA INSTALL OK is displayed. If the Installation fails, NVIDIA INSTALL FAIL is displayed.

When you use the automatic installation script V2.1, you need to modify the following parameters of the installation script to specify the versions of GPU driver, CUDA, and cuDNN, for example:

```
DRIVER_VERSION="410.104"
CUDA_VERSION="10.0.130"
CUDNN_VERSION="7.5.0"
```

Note:
If the image runs CentOS or SUSE, the installation script uses the .run installation package. If the image runs Ubuntu, the installation script uses the .deb installation package.

**Automatic installation script V2.1**

```
#!/bin/sh

#Please input version to install
DRIVER_VERSION=""
CUDA_VERSION=""
CUDNN_VERSION=""

INSTALL_DIR="/root/nvidia"
log=$(INSTALL_DIR)/nvidia_install.log

#using .deb to install driver and cuda on ubuntu OS
#using .run to install driver and cuda on ubuntu OS
nvidia_script="nvidia_install.sh"
script_download_url=$(curl http://100.100.100.200/latest/meta-data/source-address | head -1)"/opsx/ecs/linux/binary/nvidia/script/$nvidia_script"
echo $script_download_url

mkdir $INSTALL_DIR &
cd $INSTALL_DIR
wget -t 10 --timeout=10 $script_download_url &
sh $INSTALL_DIR/$nvidia_script $DRIVER_VERSION $CUDA_VERSION $CUDNN_VERSION
```

References
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.

**Install GRID drivers in compute optimized instances with GPU capabilities**
This topic describes how to install a GRID driver and build a desktop environment in a compute optimized instance with GPU capabilities in Linux.

**Manually uninstall the GPU driver**
You can manually uninstall the GPU driver. The uninstall command varies with the installation method of the GPU driver and the image type.

#unique_104

## 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>
</tr>
<tr>
<td>Product series</td>
<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</td>
<td>Tesla</td>
<td>Tesla</td>
<td>Tesla T4</td>
</tr>
<tr>
<td></td>
<td>P100</td>
<td>P4</td>
<td>V100</td>
<td>T4</td>
<td></td>
</tr>
</tbody>
</table>
3. Confirm the information is correct, then click **Download**.

### 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.

```
kernel-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](image)

**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 NVIDIA GRID drivers on vgn6i or vgn5i instances (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 NVIDIA GRID drivers on vgn6i or vgn5i instances (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 XenDeskop HDX 3D).

### 4.7.4 Manually uninstall the GPU driver

You can manually uninstall the GPU driver. The uninstall command varies with the installation method of the GPU driver and the image type.

**Context**

The GPU driver can only be uninstalled by the root user. If you are a common user, run the `sudo` command to obtain the permissions of a root user before you perform the operations.

If you have installed the GPU driver by using the automatic installation function, the uninstall method of the GPU driver varies with the operating system type:

- The run mode is used for CentOS and SUSE.
- The deb mode is used for Ubuntu.

**Uninstall the GPU driver in Ubuntu**

If you have used the deb package to install the GPU driver, we recommend that you complete the following steps to uninstall the GPU driver. This section uses Driver 410.104, CUDA 10.0.130, and cuDNN 7.5.0 as examples.

1. Run the following command to uninstall the GPU driver:
   ```bash
   apt-get remove --purge nvidia-*
   ```

2. Run the following command to uninstall CUDA and the cuDNN library:
   ```bash
   apt autoremove --purge cuda-10-0
   rm -rf /usr/local/cuda-10.0
   ```

3. Run the following command to restart the instance:
   ```bash
   reboot
   ```

If you have used the run package to install the GPU driver, we recommend that you complete the following steps to uninstall the GPU driver:

1. Run the following command to uninstall the GPU driver:
   ```bash
   /usr/bin/nvidia-uninstall
   ```

2. Run the following command to uninstall CUDA and the cuDNN library:
   ```bash
   /usr/local/cuda/bin/cuda-uninstaller
   ```
Uninstall the GPU driver in CentOS

If you have used the run package to install the GPU driver, we recommend that you complete the following steps to uninstall the GPU driver. This section uses Driver 410.104, CUDA 10.0.130, and cuDNN 7.5.0 as examples.

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

   ```bash
   /usr/bin/nvidia-uninstall
   ```

2. Run the following command to uninstall CUDA and the cuDNN library:

   ```bash
   /usr/local/cuda/bin/cuda-uninstaller
   rm -rf /usr/local/cuda-10.0
   ```

   **Note:**
   The uninstall command may differ between CUDA versions. If the cuda-uninstaller file does not exist, check whether a file whose name starts with uninstall_cuda is in the /usr/local/cuda/bin/. If yes, replace cuda-uninstaller in the command with that file name starting with uninstall_cuda.

3. Run the following command to restart the instance:

   ```bash
   reboot
   ```

If you have used the RPM package to install the GPU driver in CentOS 7, we recommend that you complete the following steps to uninstall the GPU driver:

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

   ```bash
   yum remove xorg-x11-drivers nvidia nvidia-kmod cuda-drivers
   ```
yum remove nvidia-diag-driver-local-repo-rhel7-410.104

2. Run the following command to uninstall CUDA and the cuDNN library:

   yum remove /usr/local/cuda-10.0
   rm -rf /usr/local/cuda-10.0

3. Run the following command to restart the instance:

   reboot

If you have used the RPM package to install the GPU driver in CentOS 6, we recommend that you complete the following steps to uninstall the GPU driver:

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

   yum remove xorg-x11-drv-nvidia nvidia-kmod cuda-drivers
   yum remove nvidia-diag-driver-local-repo-rhel6-410.104

2. Run the following command to uninstall CUDA:

   yum remove /usr/local/cuda-10.0

3. Run the following command to restart the instance:

   reboot

**Uninstall the GPU driver in the SUSE operating system**

If you have used the run package to install the GPU driver, we recommend that you complete the following steps to uninstall the GPU driver. This section uses CUDA v9.0.176 as an example.

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

   /usr/bin/nvidia-uninstall

2. Run the following command to uninstall CUDA and the cuDNN library:

   /usr/local/cuda/bin/uninstall_cuda_9.0.pl
3. Run the following command to restart the instance:

reboot

4.7.5 Install GRID drivers in compute optimized instances with GPU capabilities

This topic describes how to install a GRID driver and build a desktop environment in a compute optimized instance with GPU capabilities in Linux.

Prerequisites

- A compute optimized instance with GPU capabilities 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. 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 by performing the following steps: create a file named nouveau.conf in the `/etc/modprobe.d` directory, and add `blacklist nouveau` to the file.

- VNC software is installed. VNC Viewer is used in this example.

- An NVIDIA GRID license is obtained. To obtain a license, you can:
  - Submit a ticket to obtain a temporary license for trial. You do not need to build a license server to use this method.

**Note:**

You can submit a ticket to obtain a temporary license for trial only when you use vgn6i or vgn5i instances.

  - Purchase a license from **NVIDIA**. You must build a license server to use this method. You can purchase an ECS instance and build a license server by following the tutorial that is on the official website of NVIDIA.

Context

You must install an NVIDIA GRID driver if your compute optimized instance with GPU capabilities requires Open Graphics Library (OpenGL). By default, the NVIDIA GRID license that is granted to NVIDIA GPUs, such as P100, P4, and V100, is not activated. You can activate the license by using a trial license to build a license server.
Note:
Only NVIDIA partners can download the driver from the NVIDIA official website. This topic describes how to obtain the NVIDIA GRID driver package from Alibaba Cloud.

Procedure

Perform the following steps to install an NVIDIA GRID driver:

- Ubuntu 16.04 64-bit:
  1. Install a GRID driver in Ubuntu 16.04 64-bit
  2. Verify the GRID driver in Ubuntu 16.04 64-bit
- CentOS 7.3 64-bit:
  1. Install a GRID driver in 64-bit CentOS 7.3
  2. Verify installation in 64-bit CentOS 7.3

Install a GRID driver in Ubuntu 16.04 64-bit

1. Connect to the instance.
2. Run the following commands in sequence to upgrade the system and install KDE.
   
<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>apt-get update</td>
</tr>
<tr>
<td>apt-get upgrade</td>
</tr>
<tr>
<td>apt-get install kubuntu-desktop</td>
</tr>
</tbody>
</table>

3. Run the reboot command to restart the system.
4. Connect to the Linux instance again. 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, select NVIDIA-Linux-x86_64-410.39-grid.run.

<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
</table>

5. Run the following commands in sequence. Follow the prompts to install the NVIDIA GRID driver.

<table>
<thead>
<tr>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>chmod 777 NVIDIA-Linux-x86_64-410.39-grid.run</td>
</tr>
</tbody>
</table>
6. Run the `nvidia-smi` command to verify the installation.

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

```
$ nvidia-smi
Wed Apr 10 10:24:58 2019
+-----------------------------------------------------------------------------+
<table>
<thead>
<tr>
<th>NVIDIA-SMI 410.39</th>
<th>Driver Version: 410.39</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GPU</td>
<td>Name</td>
<td>Persistence-M</td>
<td>Bus-Id</td>
</tr>
<tr>
<td>Fan Temp Perf Pwr:Usage/Cap</td>
<td>Memory-Usage</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
+-----------------------------------------------------------------------------+
| 0 Tesla P4 On 10W / 75W | 00000000:05:00.0 Off | 0% Default |
| N/A 34C P8 |                |                |                |
| 1 Tesla P4 On 10W / 75W | 00000000:87:00.0 Off | 0% Default |
+-----------------------------------------------------------------------------+
| Processes: | GPU Memory Usage | | | | |
| GPU PID Type Process name | |
+-----------------------------------------------------------------------------+
| No running processes found | |
+-----------------------------------------------------------------------------+
```

7. Add a 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 license server information to the `gridd.conf` file.

```
ServerAddress=<IP address of the license server>
ServerPort=<Port of the license server (Default port: 7070)>
FeatureType=2
EnableUI=TRUE
```

8. Run the following command to install x11vnc.

```
apt-get install x11vnc
```

9. Run the `lspci | grep NVIDIA` command to query GPU BusID.

In this example, the GPU BusID is 00:07.0.
10. Configure the X Server environment and restart the system:

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

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

c) Run the `reboot` command to restart the system.

Verify the GRID driver in Ubuntu 16.04 64-bit

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

   ```
   apt-get install mesa-utils
   ```

2. Run the `startx` command to start X Server.

   - If the `startx` command is unavailable, run the `apt-get install xinit` command to install the GLX application.
   - Running `startx` may result in the `hostname: Name or service not known` error. This error does not affect the startup of X Server. You can run the `hostname` command to obtain the host name of the instance, and modify the `/etc/hosts` file by replacing the hostname that follows `127.0.0.1`, with the actual host name of your instance.

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` is restarted. In this case, 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 security group to which the instance belongs, to allow inbound traffic from TCP port 5900. For more information, see #unique_108.

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

6. Perform the following steps to run the glxinfo command to view the configurations supported by the current GRID driver.
   a) Start a new terminal session of the SSH client.
   b) Run the export DISPLAY=:1 command.
   c) Run the glxinfo -t command to list the configurations supported by the current GRID driver.

7. Run the glxgears command to test the GRID driver.
   a) On the KDE desktop, right-click the desktop and select Run Command.
   b) Run the glxgears command to start the testing application.
      If the following window appears, the GRID driver works.
Install a GRID driver in 64-bit CentOS 7.3

1. Connect to the Linux instance.

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

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

3. Run the reboot command to restart the system.

4. Connect to the Linux instance again. Run the following command to download and decompress the NVIDIA GRID driver package.

   The NVIDIA GRID driver package contains the drivers for various operating systems. For Linux, select NVIDIA-Linux-x86_64-410.39-grid.run.

   ```bash
   ```

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 content:

   ```bash
   blacklist nouveau
   options nouveau modeset=0
   ```
   c) Run `mv /boot/initramfs-$(uname -r).img /boot/initramfs-$(uname -r)-nouveau.img`.
   d) Run `dracut /boot/initramfs-$(uname -r).img $(uname -r)`.

6. Run the reboot command to restart the system.

7. Run the following commands in sequence. Follow the prompts to install the NVIDIA GRID driver.

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

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

```
$ nvidia-smi
Wed Apr 10 10:24:58 2019
+------------------------------------------------------------------------+
<table>
<thead>
<tr>
<th>NVIDIA-SMI 410.39</th>
<th>Driver Version: 410.39</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPU Name</td>
<td>Persistence-M</td>
</tr>
<tr>
<td>Fan Temp Perf Pwr:Usage/Cap</td>
<td>Memory-Usage</td>
</tr>
</tbody>
</table>
+------------------------------------------------------------------------+
| 0 Tesla P4        | On 00000000:05:00.0 Off | Off     |
| N/A 34C P8 10W / 75W | 25MiB / 8191MiB | 0% Default |
+------------------------------------------------------------------------+
| 1 Tesla P4        | On 00000000:87:00.0 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
+------------------------------------------------------------------------+
```

9. Add a 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 license server information to the `gridd.conf` file.

```
ServerAddress=<IP address of the license server>
ServerPort=<Port of the license server (Default port: 7070)>
FeatureType=2
EnableUI=TRUE
```

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

```
yum install x11vnc
```

11. Run the `lspci | grep NVIDIA` command to query GPU BusID.

In this example, the GPU BusID is 00:07.0.
12. Configure the X Server environment.
   a) Run the `nvidia-xconfig --enable-all-gpus --separate-x-screens` command.
   b) Edit `/etc/X11/xorg.conf`: Add your GPU BusID to Section "Device". In this example, BusID "PCI:0:7:0" is added.

13. Run the `reboot` command to restart the system.

Verify installation in 64-bit CentOS 7.3

1. Run the `startx` command to start X Server.

2. Start a new terminal session of the SSH client and run the following command to start `x11vnc`.

   ```
x11vnc -display :0
   ```

   If the following message appears, `x11vnc` is restarted. In this case, 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
   ```

3. Log on to the ECS console and add security group rules to the security group to which the instance belongs, to allow inbound traffic from TCP port 5900. For more information, see #unique_108.

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

5. Run the `glxinfo` command to view the configurations supported by the current GRID driver:
   a) Start a new terminal session of the SSH client.
   b) Run the `export DISPLAY=:0` command.
   c) Run the `glxinfo -t` command to list the configurations supported by the current GRID driver.
6. Run the glxgears command to test the GRID driver:
   
a) On the KDE desktop, right-click the desktop and select **Run Command**.
   
b) Run the glxgears command to start the testing application.
   
   If the following window appears, the GRID driver works.

4.7.6 Install NVIDIA GRID drivers on vgn6i or vgn5i instances (Windows)

You must install an NVIDIA GRID driver if your compute optimized instances with GPU capabilities require Open Graphics Library (OpenGL). By default, the NVIDIA GRID license that is granted to NVIDIA GPUs is not activated. You can activate the license by using a trial license to build a license server. This topic describes how to install an NVIDIA GRID driver for instances that are running 64-bit Windows Server 2016 of the lightweight vgn6i and vgn5i compute optimized instance families with GPU capabilities.

**Prerequisites**

- A vgn6i or 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.
- A remote connection tool such as VNC Viewer is installed on your local machine.
- An NVIDIA GRID license is obtained. To obtain a license, you can:
  - Submit a ticket to obtain a temporary license for trial. You do not need to build a license server to use this method.
  
  **Note:**
  You can submit a ticket to obtain a temporary license for trial only when you use vgn6i or vgn5i instances.
  
  - Purchase a license from NVIDIA. You must build a license server to use this method. You can purchase an ECS instance and build a license server by following the tutorial that is on the official website of NVIDIA.

**Procedure**

1. Remotely connect to an ECS instance. For more information, see **Overview**.

2. Download the NVIDIA GRID driver package.
   - NVIDIA GRID driver for vgn5i instances in Windows10 and Windows Server 2016
   - NVIDIA GRID driver for vgn5i instances in Windows 8, Windows 7, Windows Server 2012 R2, and Windows Server 2008 R2
   - NVIDIA GRID driver for vgn6i instances in Windows 8, Windows 7, Windows Server 2012 R2, and Windows Server 2008 R2

3. Double-click the package and follow the prompts to complete the installation.

   **Note:**
   On Windows instances where the installed GPU drivers have taken effect, Windows Remote Desktop Protocol (RDP) may not support graphics-related applications such as DirectX and OpenGL. In this case, you must install the Virtual Network Computing (VNC) server and client or use other protocols that support these applications, such as PC over IP (PCoIP) and XenDesktop HDX 3D.

4. Restart the instance.
5. Add a license server and activate the license.
   
   a) Connect to the instance.
   
   b) Right-click the desktop and click **NVIDIA Control Panel**.
   
   c) Choose **Licensing > Manage License**.
   
   d) Enter the IP address and port number of the license server. Click **Apply**.

If "Your system is licensed for GRID vGPU" is displayed, the license is activated.
4.7.7 Install NVIDIA GRID drivers on vgn6i or vgn5i instances
(Linux)

You must install an NVIDIA GRID driver if your compute optimized instances with GPU
capabilities require Open Graphics Library (OpenGL). By default, the NVIDIA GRID license
that is granted to NVIDIA GPUs is not activated. You can activate the license by using a trial
license to build a license server. This topic describes how to install an NVIDIA GRID driver for
instances that are running 64-bit Ubuntu 16.04 of the lightweight vgn6i and vgn5i compute
optimized instance families with GPU capabilities.

Prerequisites

- A vgn6i or 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.
- A remote connection tool such as VNC Viewer is installed on your local machine.
- An NVIDIA GRID license is obtained. To obtain a license, you can:
  - Submit a ticket to obtain a temporary license for trial. You do not need to build a
    license server to use this method.
    
    Note:
    You can submit a ticket to obtain a temporary license for trial only when you use
    vgn6i or vgn5i instances.
  - Purchase a license from NVIDIA. You must build a license server to use this method.
    You can purchase an ECS instance and build a license server by following the tutorial
    that is on the official website of 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. Then, add the following content
to the file to disable Nouveau:

        blacklist nouveau
        blacklist lbm-nouveau
d) Generate kernel initramfs.

```
rmmod nouveau
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.

- vgn5i GRID Guest driver package:

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

- vgn6i GRID Guest driver package:

```
```

3. Install the NVIDIA GRID driver.

- vgn5i

```
chmod +x NVIDIA-Linux-x86_64-418.70-grid.run
./NVIDIA-Linux-x86_64-418.70-grid.run
```

- vgn6i

```
chmod +x NVIDIA-Linux-x86_64-430.63-grid.run
```
4. Check whether the NVIDIA GRID driver is installed.

```
nvidia-smi
```

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

![NVIDIA-SMI Output Example](image)

5. Add a license server.

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 license server information to the `gridd.conf` file.

```
ServerAddress=<IP address of the license server>
ServerPort=<Port of the license server (Default port: 7070)>
```
6. Restart the instance for the license server configuration to take effect.

   reboot

7. Check whether the license is acquired.
   a) Connect to the instance.
   b) Check the license status.

   systemctl status nvidia-gridd

   The license is acquired if **License acquired successfully** is displayed.

---

4.8 Compute optimized type family with FPGA

4.8.1 Compute optimized instance families with FPGAs

This topic describes the features of compute optimized instance families with Field Programmable Gate Arrays (FPGAs) and lists the instance types of each family.

- Recommended instance families
  - f3, compute optimized instance family with FPGAs
- Other available instance families
  - f1, compute optimized instance family with FPGAs

f3, compute optimized instance family with FPGAs

Features:

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Uses Xilinx 16nm Virtex UltraScale+ VU9P FPGAs.
- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
• Provides a fast and reliable network based on large computing capacity.
• Suitable for the following scenarios:
  - Deep learning and inference
  - Genomics research
  - Database acceleration
  - Image transcoding such as conversion of JPEG images to WebP images
  - Real-time video processing such as H.265 video compression

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)</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.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>
</tr>
<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>
<tr>
<td>ecs.f3-c22f1.22xlarge</td>
<td>88</td>
<td>336.0</td>
<td>None</td>
<td>4 × Xilinx VU9P</td>
<td>30.0</td>
<td>4,500</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.
f1, compute optimized instance family with FPGAs

Features:

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Uses Intel® Arria® 10 GX 1150 FPGAs.
- Offers a CPU-to-memory ratio of 1:7.5.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Deep learning and inference
  - Genomics research
  - Financial analysis
  - Image transcoding
  - Computational workloads such as real-time video processing and security management

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)</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.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>
</tbody>
</table>
4.8.2 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 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 specifications.
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.

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

**Best practices**

See best practices of f1 instances:

- Use OpenCL on an f1 instance
- Use f1 RTL (Register Transfer Level)

### 4.8.3 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.
4.9 ECS bare metal instance type family

4.9.1 ECS Bare Metal Instances

This topic describes ECS Bare Metal Instances and their instance families and instance types.

- Recommended instance families
  - ebmgn6e, compute optimized ECS Bare Metal Instance family with GPU capabilities
  - ebmgn6v, compute optimized ECS Bare Metal Instance family with GPU capabilities
  - ebmgn6i, compute optimized ECS Bare Metal Instance family with GPU capabilities
  - ebmc6, compute optimized ECS Bare Metal Instance family
  - ebmg6, general purpose ECS Bare Metal Instance family
  - ebmr6, memory optimized ECS Bare Metal Instance family
  - ebmhfc6, compute optimized ECS Bare Metal Instance family with high clock speed
  - ebmhfg6, general purpose ECS Bare Metal Instance family with high clock speed
  - ebmhfr6, memory optimized ECS Bare Metal Instance family with high clock speed
  - ebmhfg5, ECS Bare Metal Instance family with high clock speed
  - ebmc4, compute optimized ECS Bare Metal Instance family

- Other available instance families
  - 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
  - ebmg5, general purpose ECS Bare Metal Instance family

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 technology 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. ECS Bare Metal Instances use virtualization 2.0 to 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 services 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.

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 to an ECS Bare Metal Instance, a failover occurs and data is retained in the disks of the ECS Bare Metal Instance.

**Benefits**

ECS Bare Metal Instances provide the following benefits through technological innovation:

- **Exclusive computing resources**
  
  ECS Bare Metal Instances provide better performance and resource isolation as compared with 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.

Comparison of ECS Bare Metal Instances, physical machines, and virtual machines

Compared with a physical machine with the same configuration, an ECS Bare Metal Instance delivers greater performance. During Double 11, ECS Bare Metal Instances delivered robust computing capabilities with millions of vCPUs to handle traffic spikes.

The following table describes a comparison between the features of ECS Bare Metal Instances, physical machines, and virtual machines. 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></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>Networking</td>
<td>Compatible with VPCs</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>Compatible with the classic network</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>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>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>

**ebmgn6e, compute optimized ECS Bare Metal Instance family with GPU capabilities**

*ebmgn6e is under invitational preview. To use ebmgn6e, submit a ticket.*

**Features**

- Provides flexible and powerful software-defined compute based on the X-Dragon architecture
- I/O optimized
- Supports enhanced SSDs (ESSDs), standard SSDs, and ultra disks
- Uses NVIDIA V100 (32 GB NVLink) GPU processors
- CPU-to-memory ratio of 1:8
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors
- Uses NVIDIA V100 GPU computing accelerators (SXM2-based)
  - Powered by the new NVIDIA Volta architecture
  - 32 GB of HBM2 memory (900 GB/s bandwidth)
  - 5,120 CUDA Cores per GPU
  - 640 Tensor Cores
  - Supports up to six NVLink connections for a total bandwidth of 300 GB/s (25 GB/s per connection)
- Provides strong network performance proportional to computing capacity
Elastic Compute Service

Instance / 4 Instance type families

- 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</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>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmgn6e. 24xlarge</td>
<td>96</td>
<td>768.0</td>
<td>None</td>
<td>8 x V100</td>
<td>256</td>
<td>32.0</td>
<td>4,800</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 specifications.

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

**Features**

- Provides 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 new NVIDIA Volta architecture
  - 16 GB of HBM2 memory (900 GB/s bandwidth)
  - 5,120 CUDA Cores per GPU
  - 640 Tensor Cores
  - Supports up to six NVLink connections for a total bandwidth of 300 GB/s (25 GB/s per connection)

- Provides strong network performance proportional to computing capacity

- 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</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>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmgn6v.24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>None</td>
<td>8 x 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:**

- 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 specifications](#).

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

**Features**
- Provides 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 standard SSDs, ultra disks, and enhanced SSDs that deliver millions of IOPS
- 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
- 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>vCPUs</th>
<th>Memory (GiB)</th>
<th>Local storage (GiB)</th>
<th>GPUs</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>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmgn6i 24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>None</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>
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 specifications.

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
• Provides high network performance with a packet forwarding rate of 6,000 Kpps
• Supports VPCs only
• Provides dedicated hardware resources and physical isolation
• 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 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 science and engineering applications

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. ebmc6. 26xlarge</td>
<td>104</td>
<td>192.0</td>
<td>None</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 specifications](#).

**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
- 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
Elastic Compute Service

**Instance / 4 Instance type families**

- **Scenarios:**
  - Workloads that require direct access to physical resources or 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-grade 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>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.ebmg6.26xlarge</td>
<td>104</td>
<td>384.0</td>
<td>None</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](https://example.com) to view the instance types available in each region.
- For more information about these specifications, see [Instance specifications](https://example.com).

**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
- Scenarios:
  - Workloads that require direct access to physical resources or 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 clusters, Spark clusters, and other memory-intensive enterprise applications

### 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. ebmr6. 26xlarge</td>
<td>104</td>
<td>768.0</td>
<td>None</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 specifications.

**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
Elastic Compute Service

- High network performance: 6,000 Kpps packet forwarding rate
- Supports VPCs only
- Provides dedicated hardware resources and physical isolation
- 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 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>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>ebmhfc6.20xlarge</td>
<td>80</td>
<td>192.0</td>
<td>None</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 specifications.

**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
Elastic Compute Service

Instance / 4 Instance type families

• 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
• Scenarios:
  - Workloads that require direct access to physical resources or 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-grade applications, such as large and medium-sized databases
  - Video encoding, decoding, and rendering

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>
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<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmhfg6</td>
<td>80</td>
<td>384.0</td>
<td>None</td>
<td>30.0</td>
<td>6,000</td>
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<td>8</td>
<td>32</td>
<td>10</td>
</tr>
<tr>
<td>20xlarge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></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 specifications.

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
- Scenarios:
  - Workloads that require direct access to physical resources or 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 clusters, Spark clusters, and other memory-intensive enterprise applications

### 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. ebmhfr6. 20xlarge</td>
<td>80</td>
<td>768.0</td>
<td>None</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 specifications.

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

Features
• I/O optimized
• Supports only standard SSDs and ultra disks
• CPU-to-memory ratio of 1:4
• Equipped with 3.7 GHz Intel® Xeon® E3-1240v6 (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
• Disabled automatic recovery
• Supports Intel® SGX
• 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-grade applications such as high-performance databases

### 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>
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<th>NIC queues</th>
<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmhf5g5.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<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 specifications](#).
ebmc4, compute optimized ECS Bare Metal Instance family

Features

- I/O optimized
- Supports only 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
- Scenarios:
  - Workloads that require direct access to physical resources or 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-grade applications, such as large and medium-sized databases
  - Video encoding

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. ebmc4. 8xlarge</td>
<td>32</td>
<td>64.0</td>
<td>None</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:

- 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 specifications.
Elastic Compute Service

Instance / 4 Instance type families

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
- 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 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

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<tr>
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<th>vCPUs</th>
<th>Memory (GiB)</th>
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<th>ENIs (including one primary ENI)</th>
<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmc5s. 24xlarge</td>
<td>96</td>
<td>192.0</td>
<td>None</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 specifications.

**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
• Scenarios:
  - Workloads that require direct access to physical resources or 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-grade applications, such as large and medium-sized databases
  - Video encoding

**Instance types**

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
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<th>Private IP addresses per ENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecs. ebmg5s. 24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>None</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 specifications.

**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
- Scenarios:
  - Workloads that require direct access to physical resources or 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 clusters, Spark clusters, and other memory-intensive enterprise applications

Instance types
### Elastic Compute Service

#### Instance / 4 Instance type families

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs (GiB)</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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</tr>
</thead>
<tbody>
<tr>
<td>ecs.ebmrs5s.24xlarge</td>
<td>96</td>
<td>768.0</td>
<td>None</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 specifications](#).

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

**Features**

- I/O optimized
- Supports only 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
- Scenarios:
  - Workloads that require direct access to physical resources or 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-grade applications, such as large and medium-sized databases
  - Video encoding
Elastic Compute Service

Instance / 4 Instance type families

### 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>
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</thead>
<tbody>
<tr>
<td>ecs. ebmg5. 24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>None</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:**
- 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 specifications](#).

### Billing methods

ECS Bare Metal Instances support pay-as-you-go and subscription billing methods. For more information, see #unique_120.

### 4.9.2 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>
</table>
| Linux            | - CentOS 7.2/7.3/7.4/6.9/6.8 64-bit  
|                  | - Ubuntu 14.04/16.04 64-bit  
|                  | - Debian 8.9/9.2 64-bit  
|                  | - openSUSE 42.3 64-bit  
|                  | - SUSE Linux Enterprise Server 12 SP2 64-bit  
| Windows          | - 2016 Data Center Edition 64-bit Chinese Edition  
|                  | - 2016 Data Center Edition 64-bit English Edition  
|                  | - 2012 R2 Data Center Edition 64-bit Chinese Edition  
|                  | - 2012 R2 Data Center Edition 64-bit English Edition  

• **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.

### 4.9.3 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.

![Diagram of computing environment]

**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:
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:

1. Download the source code from Github.
2. Compile the source code according to the README.md file.

### 4.10 Super Computing Cluster instance type family

#### 4.10.1 Overview

This topic describes the features of Super Computing Cluster (SCC) instance families and lists the instance types of each family.

**Recommended instance families**

- **scch5**, SCC instance family with high clock speed
- **sccg5**, general purpose SCC instance family
- **sccgn6**, compute optimized SCC instance family with GPU capabilities

**Introduction**

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. Therefore, SCCs have all the benefits of ECS Bare Metal Instances and can provide high-quality network performance that features high bandwidth and low latency.

SCCs are used 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 that feature high bandwidth and low latency. This guarantees the parallel efficiency of applications in such areas as high performance computing, artificial intelligence, and machine learning. The RDMA over Converged Ethernet (RoCE) rivals an InfiniBand network in terms of connection speed and can support more Ethernet-based applications.

The combination of SCCs and other Alibaba Cloud computing services such as ECS and Elastic GPU Service provides E-HPC with the ultimate high performance parallel computing resources, making supercomputing on the cloud possible.

**Comparison of SCCs, physical machines, and virtual machines**

The following table compares the features of SCCs, physical machines, and virtual machines. 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>Compute</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 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>Use of 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>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>No need to install the operating system</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>No need of local Redundant Arrays of Independent Disks (RAID), and better 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></td>
<td>Compatible with the ECS classic network</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td></td>
<td>No communication bottleneck 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 experience on features such as VNC with that on 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 only standard SSDs and ultra disks.
- Supports both RoCE and VPCs, of which RoCE is dedicated to RDMA communication.
- Provides all the features of ECS Bare Metal Instances.
- Equipped with 3.1 GHz Intel® Xeon® Gold 6149 (Skylake) processors.
- Offers a 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 processing, 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 queues</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>None</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 specifications.

sccg5, general purpose SCC instance family

Features

- I/O optimized.
- Supports only standard SSDs and ultra disks.
• Supports both RoCE and VPCs, of which RoCE is dedicated to RDMA communication.
• Provides all the features of ECS Bare Metal Instances.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
• Offers a 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 processing, 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 queues</th>
<th>ENIs (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>None</td>
<td>10.0</td>
<td>4,500</td>
<td>2 x 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.
• 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 specifications.

**sccgn6, compute optimized SCC instance family with GPU capabilities**

Features
• I/O optimized.
• Offers a CPU-to-memory ratio of 1:4.
• Equipped with 2.5 GHz Intel® Xeon® Platinum 8163 (Skylake) processors.
• Provides all the features of ECS Bare Metal Instances.
• **Storage:**
  - Supports ESSDs, standard SSDs, and ultra disks.
  - Supports a high performance CPFS.

• **Networking:**
  - Supports VPCs.
  - Supports the RoCE v2 network, which is dedicated to low-latency RDMA communication.

• Uses NVIDIA V100 GPU processors that have the SXM2 module:
  - Powered by the new NVIDIA Volta architecture.
  - 16 GB HBM2 GPU memory.
  - 5,120 CUDA cores.
  - 640 Tensor cores.
  - Offers a GPU memory bandwidth of up to 900 GB/s.
  - Supports up to six NVLink connections and a 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 processing, 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>ecs.sccgn6.24xlarge</td>
<td>96</td>
<td>384.0</td>
<td>None</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 specifications.

Billing methods

SCCs support pay-as-you-go and subscription billing methods. For more information, see #unique_120.

4.10.2 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.
4.11 Burstable performance instances

4.11.1 Overview

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

- t6, burstable instance family
- t5, burstable instance family

Scenarios

If you have purchased an enterprise-level instance, the vCPUs of the instance are reserved only for you. During this period, you are billed for the vCPU resources regardless of whether you fully utilize the performance of the vCPUs. Even if you require high levels of computing power only for a specific period during a day, you are still billed for the unused resources for the whole day. To avoid this situation, you can use burstable instances to better meet your business requirements.

Burstable instances are applicable to scenarios where you require higher-than-normal performance for a specific period, 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. The baseline performance of the instances that you purchase must meet your business requirements during off-peak hours. This way, you can enjoy the required performance at a significantly lower cost.

Note:

If the selected burstable instances cannot meet your requirements, you can change the configurations. For more information, see Change configurations.

Features

You can accumulate CPU credits for your burstable instances, and consume these credits to increase the computing power of instances when required by your workloads. This consumption pattern does not affect the environments or applications running on your instances. For more information about the baseline performance and CPU credits of burstable instances, see Baseline performance, Earn CPU credits, and Consume CPU credits.
The CPU credit mechanism allows you to minimize consumption of resources during off-peak hours, and scale resources during peak hours at no extra cost. If you have unplanned performance requirements, you can enable the unlimited mode for your instances.

An instance in standard mode will run below its baseline performance if its CPU credits are depleted. However, a burstable instance in unlimited mode allows you to overdraw or pay for additional CPU credits and utilize the CPU above its baseline performance at any time. In this case, you may be billed 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 the amount of vCPU capacity that is continuously provisioned to a burstable instance. Baseline performance varies depending on the instance type. If the vCPUs of your burstable instances are running at the baseline performance, the CPU credits that you earn are equal to the CPU credits that you consume. The Baseline CPU computing performance column in the burstable instance family table indicates the baseline performance of a single vCPU.

**Earn CPU credits**

CPU credits can be described as computing resources that are available on demand. These computing resources determine the computing performance of your burstable instances.

After you create a burstable instance, 30 CPU credits are provisioned for each vCPU of the instance, which are initial CPU credits. These credits enable 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 initial 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, the instance starts to consume CPU credits to maintain its computing performance. At the same time, the instance 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 are 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, 25% 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 25% utilization for an hour or at 100% utilization for 15 minutes (60 × 25%). In response to
its baseline performance, each vCPU earns 15 CPU credits per hour. Therefore, an ecs.t5-c1m1.large instance with two vCPUs earns 30 CPU credits per hour.

If the CPU credits earned exceed the credits consumed, the net credits are accrued as CPU credit balance. Your 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. The maximum CPU credit balance of a specific instance type is the number of CPU credits that the instance can earn within 24 hours. For more information, see the Max CPU credit balance column in the burstable instance family table. For example, an ecs.t5-c1m1.large instance can earn 30 CPU credits per hour. This way, the maximum CPU credit balance that the instance can earn is 720 (30 × 24).

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

• If the No fees for Stopped Instances (VPC-Connected) feature is disabled, your current CPU credit balance is retained and the instances continue to earn CPU credits.
• If the No fees for Stopped Instances (VPC-Connected) feature is enabled, your current CPU credit balance becomes invalid and the instances 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, your current CPU credit balance is retained, but you cannot continue to earn credits. When you restart the instance, you start to earn credits again.
• If your payment for a pay-as-you-go instance is overdue, your current CPU credit balance is retained, 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 vCPUs, CPU utilization, and operating hours. For example, you consume one CPU credit in the following scenarios:

• A vCPU runs at 100% utilization for a minute.
• A vCPU runs at 50% utilization for two minutes.
• Two vCPUs run at 25% utilization for two minutes.

When you start a burstable instance, the instance starts to consume CPU credits to maintain its computing performance. Initial credits that cannot be replenished are consumed first. When the initial credits are used up, the instance consumes the accumulated CPU credits.
• When your vCPUs run below the baseline performance, the earned credits are greater than the consumed credits. In this case, the CPU credit balance increases.

• When your vCPUs run at the baseline performance, the earned credits are equal to the consumed credits. In this case, the CPU credit balance remains unchanged.

• When your vCPUs run above the baseline performance, the earned credits are less than the consumed credits. In this case, the CPU credit balance decreases.

**Standard mode**

The performance of a burstable instance in standard mode is based on the availability of CPU credits. After the instance consumes all the initial credits and accrued CPU credits, the instance cannot run above the baseline performance. When the CPU credit balance is low, the instance gradually reduces performance to the baseline level within 15 minutes. 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](#).

The standard mode is applicable to scenarios where you have stable workloads, do not need instances to run above the baseline performance for an extended period of time, and may occasionally need burst performance, 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 obtain performance boosts at any time. If you keep running your instances above the baseline performance after the initial CPU credits and accrued credits are consumed, the CPU credits will change as shown in the following figure. The two concepts involved in the figure are described as follows:

• **Advance CPU credits:** Advance CPU credits are credits that you can pay for in advance and can receive within 24 hours after you make the payment.

• **Overdrawn CPU credits:** Overdrawn CPU credits are used when you have consumed all the advance CPU credits to make sure that the instance is running above the baseline performance. You will be billed for using overdrawn CPU 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 CPU credits in addition to your credit balance to meet burstable performance requirements. Examples:

- Certain events, such as new feature releases, e-commerce promotions, and website promotions, will cause a substantial increase to your workloads. High CPU performance
is expected during this period of time. In this case, you can enable the unlimited mode for your instances. You can disable the mode to save costs when the workload peak ends.

- Some web applications may require CPU bursts for a specific period during a day, but the daily average CPU utilization is below the baseline CPU utilization. In this case, you can enable the unlimited mode for your instances during peak hours to ensure a positive customer experience. If the CPU credits that you have earned during off-peak hours can offset the advance CPU credits that you consumed during peak hours, you can ensure overall positive customer experience without the need to pay extra fees.

**Note:**
When you create a burstable instance, the standard mode is enabled by default. For more information about how to enable the unlimited mode, see Enable the unlimited mode.

**Change configurations**

During monitoring, you may find that the vCPUs are constantly running above or below the baseline performance. This indicates that the instance type cannot meet 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 based on your needs. For more information, see Instance families that support instance type changes.

The operation of changing configurations varies based on the 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 when compared with the t5 burstable instance family.
- Delivers a bandwidth of up to 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

### Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memo (GiB)</th>
<th>Baseline CPU computing performance</th>
<th>Max CPU credits per hour</th>
<th>Local storage (GiB)</th>
<th>Base bandwidth (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.t6-c4m1.large</td>
<td>2</td>
<td>0.5</td>
<td>5%</td>
<td>6</td>
<td>144</td>
<td>None</td>
<td>0.08</td>
<td>40</td>
<td>Yes</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>None</td>
<td>0.08</td>
<td>60</td>
<td>Yes</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>None</td>
<td>0.08</td>
<td>100</td>
<td>Yes</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>0.08</td>
<td>100</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Elastic Compute Service

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPUs</th>
<th>Memory (GiB)</th>
<th>Baseline CPU computing performance</th>
<th>Max CPU credits per hour</th>
<th>Local storage (GiB)</th>
<th>Base 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 per ENI</th>
</tr>
</thead>
<tbody>
<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>0.08</td>
<td>100</td>
<td>Yes</td>
<td>1</td>
<td>2</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>0.16</td>
<td>200</td>
<td>Yes</td>
<td>1</td>
<td>2</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>0.32</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Note:**
- When you bind or unbind an ENI, instances of the following instance types must be in the stopped state: ecs.t6-c1m1.large, ecs.t6-c1m2.large, ecs.t6-c1m4.large, ecs.t6-c2m1.large, and ecs.t6-c4m1.large.
- 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 specifications.

**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

Instance types

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Baseline CPU performance</th>
<th>Max CPU credits per hour</th>
<th>Local storage (GiB)</th>
<th>Max CPU credit balance</th>
<th>Local Bandwidth (Gbit/s)</th>
<th>Packets forwarding rate (Kpps)</th>
<th>IPv6 support</th>
<th>NIC queues (including one primary ENI)</th>
<th>ENIs</th>
<th>Private IP addresses per 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>2</td>
<td>2</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>2</td>
<td>2</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>2</td>
<td>2</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>2</td>
<td>2</td>
</tr>
</tbody>
</table>
## Elastic Compute Service

<table>
<thead>
<tr>
<th>Instance type</th>
<th>vCPU</th>
<th>Memory (GiB)</th>
<th>Baseline CPU computing performance</th>
<th>CPU credits per hour</th>
<th>Max CPU credits balance</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.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>2</td>
<td>2</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>100</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</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>100</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</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>100</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</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>200</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<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>200</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Instance type</td>
<td>vCPU</td>
<td>Mem (GiB)</td>
<td>Baseline CPU computing performance</td>
<td>Max CPU credits per hour</td>
<td>Local storage (GiB)</td>
<td>Bandwidth (Gbit/s)</td>
<td>Packets forwarding 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>
<td></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>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m4.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>60%</td>
<td>1,440</td>
<td>None</td>
<td>0.8</td>
<td>200</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m1.2xlarge</td>
<td>8</td>
<td>8.0</td>
<td>60%</td>
<td>2,880</td>
<td>None</td>
<td>1.2</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m2.2xlarge</td>
<td>8</td>
<td>16.0</td>
<td>60%</td>
<td>2,880</td>
<td>None</td>
<td>1.2</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m4.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>60%</td>
<td>2,880</td>
<td>None</td>
<td>1.2</td>
<td>400</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m1.4xlarge</td>
<td>16</td>
<td>16.0</td>
<td>60%</td>
<td>2,880</td>
<td>None</td>
<td>1.2</td>
<td>600</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ecs.t5-c1m2.4xlarge</td>
<td>16</td>
<td>32.0</td>
<td>60%</td>
<td>2,880</td>
<td>None</td>
<td>1.2</td>
<td>600</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
**Note:**

- When you bind or unbind an ENI, instances of the following instance types must be in the stopped state: `ecs.t5-lc2m1.nano`, `ecs.t5-c1m1.large`, `ecs.t5-c1m2.large`, `ecs.t5-c1m4.large`, `ecs.t5-lc1m1.small`, `ecs.t5-lc1m2.large`, `ecs.t5-lc1m2.small`, and `ecs.t5-lc1m4.large`.
- 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 specifications](#).

### 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 are provisioned when you create a burstable instance. You can earn 30 credits for each vCPU. These credits cannot be replenished when used up.</td>
<td>For more information, see <a href="#">Earn CPU credits</a>.</td>
</tr>
<tr>
<td>CPU credit balance</td>
<td>The net credits that are accrued when the earned CPU credits exceed the consumed credits. You can use these credits to run instances above the baseline performance.</td>
<td>For more information, see <a href="#">Earn CPU credits</a>.</td>
</tr>
<tr>
<td>Max CPU credit balance</td>
<td>The CPU credits that a burstable instance can earn within 24 hours. Your 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.</td>
<td>For more information, see <a href="#">Earn CPU credits</a>.</td>
</tr>
</tbody>
</table>
### 4.11.2 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.

4.11.3 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:
Elastic Compute Service

Instance / 4 Instance type families

<table>
<thead>
<tr>
<th>Instance Type</th>
<th>Availability Zones</th>
<th>Network</th>
<th>Storage</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>t5.2xlarge</td>
<td>16</td>
<td>public</td>
<td>SSD</td>
<td>Preemptible</td>
</tr>
</tbody>
</table>

**CPU Credits Usage**

- CPU credits are used up quickly when the instance is running at baseline performance.
- CPU credits are earned when the instance is idle or running at less than baseline performance.
- CPU credits are consumed when the instance is running at baseline performance.

**CPU Credit Balance Formula**

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.

CPU credit balance (0) = CPU credit balance at the end of phase G (168) – 2 × CPU credits consumed per hour (96) + 2 × 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.

CPU credit balance (0) = CPU credit balance at the end of phase H (0) – 5 × CPU credits consumed per hour (12) + 5 × 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.

CPU credit balance (36) = CPU credit balance at the end of phase I (0) + 3 × 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.

4.11.4 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_120.

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 Instance purchase fee.</td>
<td>None</td>
</tr>
<tr>
<td>Unlimited mode</td>
<td>The fee is determined by the billing method, not the performance mode. For more information, see Instance purchase fee.</td>
<td>If your instance consumes additional CPU credits, you may need to pay additional fees:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Overdrawn CPU credits are billed by hour.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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_{...}</td>
</tr>
</tbody>
</table>
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>
<tr>
<td>Outside Mainland China</td>
<td>0.0016</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 (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](#).
4.11.5 Create a burstable instance

This topic describes how to create a t5 or t6 burstable instance.

Context

This topic focuses on the configuration items that you must pay attention to when you create a burstable instance. For more information about general configuration items, see Create an instance by using the provided wizard.

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Instances.
3. Click Create Instance.

When you configure parameters, note that:

- **Region**: Instance types that are available to your account in each region are displayed on the instance creation page.

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

- **Instance Type**: Select x86-Architecture for Architecture and Entry-Level (Shared) for Category. You can select Enable Unlimited Mode for ts Instances when you create a burstable instance or after the instance is created. For more information, see Enable the unlimited mode.

- **Image**: Burstable instance types have a minimum memory of 0.5 GiB. They only support Linux and Windows Server Version 1809, and do not support the operating systems that require more than 0.5 GiB memory, such as Windows Server 2016. For more information, see #unique_138.


Only the network type of VPC is supported.


8. Confirm that all information is correct. Click Create Instance.

### 4.11.6 Switch the performance mode of a burstable instance

A burstable instance can run in standard or unlimited mode. This topic describes how to query and switch the performance mode of a burstable instance.

**Context**

If a burstable instance in standard mode does not have initial credits and exhausts its CPU credit balance, the instance will be unable to burst beyond its performance baseline. If a burstable instance in unlimited mode depletes its CPU credit balance, the instance can spend advance or overdraft CPU credits to burst beyond its performance baseline. In this case, you may be billed for the consumption of these CPU credits. For more information, see Unlimited mode.

- By default, the standard mode is enabled for newly created burstable instances.
- If a burstable instance is in the Stopped state and the No Fees for Stopped Instances (VPC-Connected) feature is enabled, the instance runs in the standard mode by default after it is started.
- If a burstable instance is in the **Stopped** state and the No Fees for Stopped Instances (VPC-Connected) feature is not enabled, the performance mode used before the instance is stopped will continue to take effect after the instance is started.
- If your account has overdue payments, the unlimited mode will be disabled for burstable instances automatically and will not be re-enabled until you settle the payments.

**Query the performance mode of a burstable instance**

1. Log on to the **ECS console**.
2. In the left-side navigation pane, choose **Instances & Images > Instances**.
3. Optional: If the **Unlimited Mode** column is not displayed on the **Instances** page, configure the column to be displayed.
   a) Click the icon in the upper-right corner.
   b) In the Column Filters dialog box that appears, select **Unlimited Mode** and click **OK**.
4. Find the target burstable instance and view the value in the **Unlimited Mode** column.
   - **Disabled**: indicates that the instance is in standard mode.
   - **Enabled**: indicates that the instance is in unlimited mode.

**Enable the unlimited mode**

**Prerequisites:**
- The target burstable instance is in the **Running** state.
- The burstable instance is in standard mode.

To enable the unlimited mode for a burstable instance, perform the following operations:

1. Log on to the **ECS console**.
2. In the left-side navigation pane, choose **Instances & Images > Instances**.
3. Find the target burstable instance and use one of the following methods to enable the unlimited mode for the instance:

   • To enable the unlimited mode for a single burstable instance, choose More > Instance Settings > Enable Unlimited Mode from the Actions column corresponding to the instance.

   • To enable the unlimited mode for one or more burstable instances, select the target instances and choose More > Instance Settings > Enable Unlimited Mode at the lower-left corner of the Instances page.

4. In the Enable Unlimited Mode message that appears, click OK.

**Disable the unlimited mode**

**Prerequisites:**

   • The target burstable instance is in the Running state.

   • The burstable instance is in unlimited mode.

To disable the unlimited mode for a burstable instance, perform the following operations:

1. Log on to the ECS console.

2. In the left-side navigation pane, choose Instances & Images > Instances.

3. Find the target burstable instance and use one of the following methods to disable the unlimited mode for the instance:

   • To disable the unlimited mode for a single burstable instance, choose More > Instance Settings > Disable Unlimited Mode from the Actions column corresponding to the instance.

   • To disable the unlimited mode for one or more burstable instances, select the target instances and choose More > Instance Settings > Disable Unlimited Mode at the lower-left corner of the Instances page.

4. In the Disable Unlimited Mode message that appears, click OK.

**Related topics**

#unique_139

**4.11.7 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_141.

**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_142
#unique_143
4.11.8 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**.

![Summary of billing items]

You can also view **SurplusCredit** in the **Cost details** area to check the cost details of a single purchase.

![Cost details]

### 4.12 Shared instance families

This topic introduces the features of shared instance families and their instance types.

- **s6**, shared standard instance family
- **Previous-generation shared instance families**

Shared instances use a CPU-unbound scheduling scheme. Each vCPU is randomly allocated to an idle CPU hyperthread. The vCPUs of different instances compete for CPU resources. This results in fluctuations in computing performance when traffic loads are heavy. Shared instances can only ensure availability but not performance in the SLA. Compared with enterprise-grade instances that have exclusive resources, shared instances only share resources. Therefore, shared instances cannot guarantee consistent computing performance but they have a lower cost.

**s6, shared standard instance family**

**Features:**

- More cost-effective than the previous-generation shared instance families (xn4, n4, mn4, and e4)
- Equipped with 2.5 GHz Intel® Xeon® Platinum 8269CY (Cascade Lake), with Turbo Boost up to 3.2 GHz for consistent computing performance
- Paired with DDR4 memory
- Supports multiple CPU-to-memory ratios, such as 1:1, 1:2, and 1:4
- I/O-optimized
- Supports enhanced SSDs, standard SSDs, and ultra disks
- Supports VPCs only
- Scenarios:
  - Small and medium-sized websites, and web applications
  - Development environments, servers, code repositories, microservices, and testing and staging environments
  - Lightweight databases and caches
  - Lightweight enterprise applications and integrated application services

The following table describes the instance types that belong to the s6 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>Base 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.s6-c1m1.small</td>
<td>1</td>
<td>1.0</td>
<td>None</td>
<td>0.1</td>
<td>150</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.s6-c1m2.small</td>
<td>1</td>
<td>2.0</td>
<td>None</td>
<td>0.1</td>
<td>150</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.s6-c1m4.small</td>
<td>1</td>
<td>4.0</td>
<td>None</td>
<td>0.1</td>
<td>150</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.s6-c1m2.large</td>
<td>2</td>
<td>4.0</td>
<td>None</td>
<td>0.2</td>
<td>200</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.s6-c1m4.large</td>
<td>2</td>
<td>8.0</td>
<td>None</td>
<td>0.4</td>
<td>200</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.s6-c1m2.xlarge</td>
<td>4</td>
<td>8.0</td>
<td>None</td>
<td>0.4</td>
<td>300</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
### Elastic Compute Service

#### Instance type / 4 Instance type families

<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>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.s6-c1m4.xlarge</td>
<td>4</td>
<td>16.0</td>
<td>None</td>
<td>0.8</td>
<td>300</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.s6-c1m2.2xlarge</td>
<td>8</td>
<td>16.0</td>
<td>None</td>
<td>0.8</td>
<td>600</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.s6-c1m4.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<td>1.2</td>
<td>600</td>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:**

- To bind or unbind an ENI, instances of the following instance types must be in the stopped state: ecs.s6-c1m1.small, ecs.s6-c1m2.large, ecs.s6-c1m2.small, ecs.s6-c1m4.large, and ecs.s6-c1m4.small.
- 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, see [Instance specifications](#).

### Previous-generation shared instance families

Features of xn4, n4, mn4, and e4:

- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors
- Paired with DDR4 memory
- Supports multiple CPU-to-memory ratios
<table>
<thead>
<tr>
<th>Instance family</th>
<th>Description</th>
<th>vCPU-to-memory ratio</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>xn4</td>
<td>Shared 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>Shared 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>Shared 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>Shared memory type</td>
<td>1:8</td>
<td>• Applications that require a large 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 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)</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.xn4.small</td>
<td>1</td>
<td>1.0</td>
<td>None</td>
<td>0.5</td>
<td>50</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**Note:**

- To bind or unbind an ENI, instances of the ecs.xn4.small instance type must be in the stopped state.
- 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, see [Instance specifications](#).

The following table describes the instance types that belong to the n4 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)</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.n4.small</td>
<td>1</td>
<td>2.0</td>
<td>None</td>
<td>0.5</td>
<td>50</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n4.large</td>
<td>2</td>
<td>4.0</td>
<td>None</td>
<td>0.5</td>
<td>100</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n4.xlarge</td>
<td>4</td>
<td>8.0</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.n4.2xlarge</td>
<td>8</td>
<td>16.0</td>
<td>None</td>
<td>1.2</td>
<td>300</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>None</td>
<td>2.5</td>
<td>400</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
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<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.n4.8xlarge</td>
<td>32</td>
<td>64.0</td>
<td>None</td>
<td>5.0</td>
<td>500</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:**

- To bind or unbind an ENI, instances of the ecs.n4.small and ecs.n4.large instance types must be in the stopped state.
- 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, see Instance specifications.

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)</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.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>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.mn4.large</td>
<td>2</td>
<td>8.0</td>
<td>None</td>
<td>0.5</td>
<td>100</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.mn4.xlarge</td>
<td>4</td>
<td>16.0</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.mn4.2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<td>1.2</td>
<td>300</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
### Instance Type Specifications

<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 Forward 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. mn4. 4xlarge</td>
<td>16</td>
<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>
<td>32</td>
<td>128.0</td>
<td>None</td>
<td>5</td>
<td>500</td>
<td>No</td>
<td>2</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

**Note:**
- To bind or unbind an ENI, instances of the ecs.mn4.small and ecs.mn4.large instance types must be in the stopped state.
- 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, see [Instance specifications](#).

The following table describes the instance types that belong to the e4 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)</th>
<th>Packet Forward 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.e4. small</td>
<td>1</td>
<td>8.0</td>
<td>None</td>
<td>0.5</td>
<td>50</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>ecs.e4. large</td>
<td>2</td>
<td>16.0</td>
<td>None</td>
<td>0.5</td>
<td>100</td>
<td>No</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<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>Instance type</td>
<td>vCPUs (GiB)</td>
<td>Memory (GiB)</td>
<td>Local storage (GiB)</td>
<td>Bandwidth (Gbit/s)</td>
<td>Packet forwarding 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>
<td>---------------------</td>
<td>-------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>-----------------------------</td>
<td>--------------</td>
<td>-----------</td>
<td>----------------------------------</td>
<td>-----------------------------</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:

- To bind or unbind an ENI, instances of the ecs.e4.small and ecs.e4.large instance types must be in the stopped state.
- 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 specifications.

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>
<th>1 Month</th>
<th>2 Months</th>
<th>3 Months</th>
<th>6 Months</th>
<th>1 Year</th>
</tr>
</thead>
</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_147.

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_148 and #unique_122.

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: $</th>
<th>+</th>
<th>Marketplace Image Fees: $</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_149.

- **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 subscrip-
tion 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>
<th>Note</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 ECS Pricing.</td>
<td>Local disks attached to an instance are billed together with the instance.</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>
<td></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 ECS Pricing.</td>
<td>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>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>
<td>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>
</tbody>
</table>
### Instance / 5 Instance purchasing options

<table>
<thead>
<tr>
<th>Resource</th>
<th>Formula</th>
<th>Unit price</th>
</tr>
</thead>
<tbody>
<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>For more information, see #unique_149.</td>
<td></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.

![Diagram showing the procedure for calculating the price of an ECS instance](image)

#### Changes in resource status after expiration

#### Notice:
The system may send you notifications that your instances expire. When this occurs, please renew your instances to avoid instances being released. Please note that your instances may be released at a system-selected time after the expiration date. If you still have problems, submit a ticket.

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>The ECS instance is released.</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> 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></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>• Subscription disks are released and data on them cannot be restored.</td>
</tr>
<tr>
<td></td>
<td>• Local disks and data on them are retained, but the local disks cannot be used.</td>
<td><strong>Note:</strong> 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>
</tr>
<tr>
<td></td>
<td>• Share Block Storage devices and data on them are retained, but the devices cannot be used.</td>
<td>• Local disks are released and data on them cannot be restored.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shared Block Storage devices are automatically detached.</td>
</tr>
<tr>
<td>Public IP addresses</td>
<td>• Instances in classic networks: Fixed public IP addresses are retained.</td>
<td>• Instances in classic networks: Fixed public IP addresses are released.</td>
</tr>
<tr>
<td></td>
<td>• Instances in a VPC</td>
<td>• Instances in a VPC</td>
</tr>
<tr>
<td></td>
<td>- Fixed public IP addresses are retained.</td>
<td>- Fixed public IP addresses are released.</td>
</tr>
<tr>
<td></td>
<td>- The EIP associated with the instance is not affected.</td>
<td>- The EIP is disassociated from the instance.</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 unavailable.</td>
<td>Images are unavailable.</td>
</tr>
<tr>
<td>Resource</td>
<td>Within 15 days after expiration</td>
<td>More than 15 days after expiration</td>
<td>More than 30 days after expiration</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Block storage</td>
<td>• Cloud disks and data on them are retained. The cloud disks can work properly.</td>
<td>• Cloud disks and data on them are retained, but the cloud disks cannot be used.</td>
<td>• Subscription disks are released and data on them cannot be restored.</td>
</tr>
<tr>
<td></td>
<td>• Local disks and data on them are retained. The local disks can work properly.</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. The devices can work properly.</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></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public IP addresses</td>
<td>• Instances in classic networks: Fixed public IP addresses are retained.</td>
<td>• Instances in classic networks: Fixed public IP addresses are retained.</td>
<td>• Instances in classic networks: Fixed public IP addresses are released.</td>
</tr>
<tr>
<td></td>
<td>• Instances in a VPC - Fixed public IP addresses are retained.</td>
<td>• Instances in a VPC - Fixed public IP addresses are retained.</td>
<td>• Instances in a VPC - Fixed public IP addresses are released.</td>
</tr>
<tr>
<td></td>
<td>• The EIP associated with the instance is not affected.</td>
<td>• The EIP associated with the instance is not affected.</td>
<td>• The EIP is disassociated from the instance.</td>
</tr>
</tbody>
</table>

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.
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_122.

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.

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_149.

- **Image Fees** indicates that you selected a paid image when creating the instance.

**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.
<table>
<thead>
<tr>
<th>Resource</th>
<th>Billing duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS instance</td>
<td>The billing duration is affected by the network type of the instance.</td>
</tr>
<tr>
<td></td>
<td>• For an ECS instance in a classic network, billing starts when the instance is</td>
</tr>
<tr>
<td></td>
<td>created and stops when the instance is released.</td>
</tr>
<tr>
<td></td>
<td>• For an ECS instance in a VPC, the billing duration depends on whether the No</td>
</tr>
<tr>
<td></td>
<td>fees for stopped VPC instances feature is enabled.</td>
</tr>
<tr>
<td></td>
<td>- If this feature is not enabled, billing starts when the instance is created and</td>
</tr>
<tr>
<td></td>
<td>stops when the instance is released.</td>
</tr>
<tr>
<td></td>
<td>- If this feature is enabled, billing starts when the instance is created or is</td>
</tr>
<tr>
<td></td>
<td>restarted in the ECS console and stops when the instance is stopped by using the</td>
</tr>
<tr>
<td></td>
<td>ECS console or when the instance is released.</td>
</tr>
<tr>
<td></td>
<td>For more information, see #unique_152.</td>
</tr>
<tr>
<td>Notice:</td>
<td>If you stop the instance by switching off its operating system, you cannot enjoy</td>
</tr>
<tr>
<td></td>
<td>the benefits provided by the No fees for stopped VPC instances feature.</td>
</tr>
<tr>
<td>You can purchase reserved</td>
<td>You can purchase reserved instances to reduce your costs. For more information,</td>
</tr>
<tr>
<td>instances to reduce your costs.</td>
<td>see Reserved instance overview.</td>
</tr>
<tr>
<td>Images</td>
<td>The billing starts when the instance is created and stops when the instance is</td>
</tr>
<tr>
<td></td>
<td>released.</td>
</tr>
<tr>
<td>Cloud disks (system disks)</td>
<td>The billing starts when the instance is created and stops when the instance is</td>
</tr>
<tr>
<td></td>
<td>released.</td>
</tr>
<tr>
<td>Cloud disks (data disks)</td>
<td>The billing starts when the data disk is created and stops when the data disk is</td>
</tr>
<tr>
<td></td>
<td>released.</td>
</tr>
<tr>
<td>Internet bandwidth (Pay-By-Bandwidth)</td>
<td>The billing starts when Internet bandwidth (Pay-By-Bandwidth) is enabled and</td>
</tr>
<tr>
<td></td>
<td>stops when Internet bandwidth is disabled or the ECS instance is released.</td>
</tr>
<tr>
<td></td>
<td>For information about how to disable Internet bandwidth, see Change the Internet</td>
</tr>
<tr>
<td></td>
<td>bandwidth of a pay-as-you-go instance.</td>
</tr>
<tr>
<td>Snapshots</td>
<td>The billing starts when a snapshot is created and stops when the snapshot is</td>
</tr>
<tr>
<td></td>
<td>deleted.</td>
</tr>
</tbody>
</table>

**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>Note: Local disks attached to an instance are billed together with the instance.</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>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: The price on the page is USD/100 GiB/hour. Divide it by 100 to obtain the unit price per GiB.</td>
</tr>
</tbody>
</table>
### Elastic Compute Service

#### Instance / 5 Instance purchasing options

<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 <strong>Storage Fee &gt; Data Disk</strong> on <strong>ECS Pricing</strong>.</td>
</tr>
<tr>
<td></td>
<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>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></td>
<td></td>
<td>For more information, see #unique_149.</td>
<td></td>
</tr>
<tr>
<td>Snapshots</td>
<td>Hour</td>
<td>Snapshot unit price × Snapshot capacity × Billing duration</td>
<td>For more information, see <strong>Snapshot Fee</strong> on <strong>ECS pricing</strong>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For more information, see #unique_153.</td>
<td></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. When a pay-as-you-go ECS instance is Out of service, it enters the Expired state and the billing stops. After the instance stops providing services, you cannot remotely connect to the instance, or access websites deployed on the instance. Service errors will occur.</td>
<td>The ECS instance is released. Note: If your ECS instance is released due to overdue payment, Alibaba Cloud will send you an email notification.</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>• Cloud disks are released and data on them cannot be restored.</td>
</tr>
<tr>
<td></td>
<td>• Local disks and data on them are retained, but the local disks cannot be used.</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>Note: If the performance of cloud disks or local disks is limited, they cannot properly process I/O read and write requests. This affects the normal running of the ECS instance mounted to these disks, such as excessive time needed to perform operations and unpredictable power-off or restart failures for some operating systems.</td>
<td>• Local disks are released and data on them cannot be restored. • Shared block storage devices are automatically detached, but data on them is retained.</td>
</tr>
</tbody>
</table>
### 5.3 Preemptible instances

#### 5.3.1 Overview

Preemptible instances are a type of on-demand instance. You can use this type of instances to minimize ECS instance costs in a variety of scenarios.

**Introduction**

The market price of a preemptible instance fluctuates based on changes to the supply and demand of its instance type. When you create a preemptible instance, you must specify a maximum price per hour to bid for a specific instance type. If your bid is higher than that of the current market price and the stock of the instance type is sufficient, your instance is created and billed at 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 this period, the instance is not released even if your bid is lower than the current market price, which ensures that the instance can run services normally. One hour later, the system checks the market price and the stock of the instance type every five minutes. If the market price is higher than your bid or if the stock of the instance type is insufficient, your preemptible instance is released. For more information about preemptible instances, see [ECS instance FAQ](#).

---

### Resource | Within 15 days after out-of-service | More than 15 days after out-of-service
---

**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 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.
### 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_155].

The following figure shows the lifecycle of a preemptible instance.

![Lifecycle of a preemptible instance diagram](image)

After a preemptible instance is created, you can release the instance at any time. For more information, see [Release an instance](#). When the market price exceeds your bid or when the stock of the instance type is insufficient, your instance will enter the **To Be Released** state. After five minutes, the instance is automatically released. You can check whether the instance enters the **To Be Released** state based on the instance metadata or the `DescribeInstances` operation.

You can check whether your preemptible instance enters the **To Be Released** state and save a small amount of data while you wait for the release of the instance. However, we recommend that you optimize the application design to ensure that the application runs properly after your preemptible instance is released. You can try to manually release your preemptible instance to check whether the application runs properly after the preemptible instance is released.
Typically, the system first releases the instance with the lowest bid price. If multiple preemptible instances have the same bid price, the system randomly determines the order in which the instances are released.

**Limits**

- 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.
- For information about the quota of preemptible instances, see the "Instance limits" section in *Limits*.

**Scenarios**

Preemptible instances are ideal for stateless applications, such as scalable web services, image rendering, big data analytics, and large-scale parallel computing. Preemptible instances can be applied to applications that require a high level of distribution, scalability, and fault tolerance capabilities to save costs and increase throughput of these applications.

You can use preemptible instances for the following business:

- Real-time analysis
- Big data
- Geospatial surveys
- Image and media coding
- Scientific computing
- Scalable websites and web crawlers
- Tests

Preemptible instances are not suitable for stateful applications such as databases, because when a preemptible instance is released due to a failed bid or other reasons, it is difficult to store application state data.
Price and billing

• Price

The price of a preemptible instance covers only the price of the instance type (including vCPUs and memory) and excludes the prices of resources such as system disks, data disks, and network bandwidth.

- 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 method of pay-as-you-go instances. For more information, see #unique_149.

• Market price

The market price of a preemptible instance fluctuates based on changes to the demand for and supply of its instance type. When you attempt to create a preemptible instance, you can make it if your bid price is higher than the current market price of the specified instance type and the stock of the instance type is sufficient.

Within the first hour after the instance is created, the instance is billed based on the market price at the time of bidding. After one hour, the instance is billed based on the real-time market price.

We recommend that you pay attention 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 the second. The market price of a preemptible instance is an hourly price. You can divide the hourly price by 3,600 to get the price per second.

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

A preemptible instance is billed based on its actual usage period, which lasts from the creation to the release of the instance. If you stop an instance only by calling the StopInstance operation or from the ECS console, the instance continues to be billed. 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 as needed.

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.
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:

1. Choose **Billing Management > Billing Management**.
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 View bills of a preemptible instance

This topic describes how to view the bills of a preemptible instance.

**Context**

The cost of a pay-as-you-go instance is the standard hourly price, whereas the cost of a preemptible instance is the actual transaction price.

**Procedure**

Perform the following operations to view the bills of a preemptible instance on the Billing Management page:

1. Log on to the **ECS console**.
2. In the top navigation bar of the ECS console, choose **Billing Management > Billing Management**.

3. In the left-side navigation pane, choose **Spending Summary > Instance Spending Detail**.

4. Enter the ID of the preemptible instance whose bills you want to view to search for the instance. Find the instance in the searching results and click **Detail** in the **Action** column. You can also search for instance bills by product family, product name, or billing method.

5.3.4 **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_152 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>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>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></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></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>
</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_164
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 can also be used to reserve instance resources. A combination of reserved and pay-as-you-go instances provides a similar cost-effectiveness to subscription instances but with a higher degree of flexibility.

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 that uses the pay-as-you-go billing method. A pay-as-you-go instance is equivalent to a virtual machine. For more information, see Pay-as-you-go.</td>
<td>An instance that uses the subscription billing method. A subscription instance is equivalent to a virtual machine. For more information, see Subscription.</td>
</tr>
<tr>
<td>Purpose</td>
<td>Reserved instances cannot be used on their own. 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 you purchase a reserved instance, you can specify the payment option, term, and instance 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.

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. If you are sure about the zones in which the instances are deployed, choose zonal reserved instances. Otherwise, choose regional reserved instances to ensure that your business is not affected due to uncertain changes.

• **Computing power**: the maximum computing resources that a reserved instance can match. The computing power is determined 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 in 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 in Zone H of China (Hangzhou).

If you need more reserved instances, submit a ticket.

• **Billing method**

Reserved instances can match only pay-as-you-go instances. Reserved instances cannot match preemptible instances.
• Instance types

Instance families that can use reserved instances include:

- Compute optimized instance families: c6, c5, ic5, and sn1ne
- General purpose instance families: g6, g5, and sn2ne
- Memory optimized instance families: r6, r5, and se1ne
- Instance families with local SSDs: i2 and i2g
- Instance families with high clock speed: hfc6, hfc5, hfg6, hfg5, and hfr6
- ECS Bare Metal Instance families: ebmc6, ebmg6, ebmr6, ebmhfc6, ebmhfg6, and ebmhfr6
- Burstable instance families: t6 and t5

Burstable instances can match zonal reserved instances but cannot match regional reserved instances. Reserved instances that match burstable instances cannot be merged, split, or changed in scopes. For more information, see Billing.

Billing

For more information, see Reserved instance billing.

References

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:

• Split a reserved instance
• Merge reserved instances
• Change the scope of a reserved instance

For more information about reserved instance FAQ, see ECS instance FAQ.
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. A regional RI can match different sizes of Pay-As-You-Go instances that are of the same instance type family in the same region.</td>
<td>Not supported. A zonal RI must match one or more Pay-As-You-Go instances of a specified size.</td>
<td>You have the following running Pay-As-You-Go instances: Two ecs.c5.xlarge Linux instances in China (Qingdao). The instance names are C5PAYG-1 and C5PAYG-2 respectively. You purchase the following RI: One regional ecs.c5.2xlarge RI in China (Qingdao). The RI name is C5RI. After the purchase, C5RI matches C5PAYG1 and C5PAYG2 simultaneously to provide a billing discount.</td>
</tr>
<tr>
<td>Zone flexibility</td>
<td>Supported. A regional RI can match all Pay-As-You-Go instances in the same region.</td>
<td>Not supported. A zonal RI must match one or more Pay-As-You-Go instances in a specified zone.</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>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>Resource Reservation</td>
<td>Not supported</td>
<td>Supported.</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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A specified number of Pay-As-You-Go instances are reserved so that these instances can be created successfully.</td>
<td>Ten ecs.c5.xlarge instances will be reserved in zone B of China (Qingdao) for one year.</td>
</tr>
</tbody>
</table>

### 5.4.3 Purchase reserved instances

This topic describes how to purchase reserved instances in the ECS console.

**Prerequisites**

- Before you purchase reserved instances, make sure that the pay-as-you-go instances you want to match meet the requirements for applying reserved instances. For more information, see the Limits section of [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](#).

**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 the region-related parameters.
   a) Select a region.
   b) Set Resource Reservation.

   **Note:**

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Issue: 20200518
Only zonal reserved instances support resource reservation. Regional reserved instances apply to pay-as-you-go instances of different sizes in different zones within the same region.

c) Select a zone from the Zone drop-down list.

6. Configure the instance-related parameters.

   a) Select an instance type.

   ![Note:](image)
   
   You must select an instance size when you purchase a regional reserved instance. 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.

   You can select **Linux** or **Windows**.

   ![Note:](image)
   
   The reserved instance only matches pay-as-you-go instances that use the selected type of operating system. The operating system of an reserved instance cannot be changed after you purchase it.

   To apply a reserved instance to pay-as-you-go instances created from Bring Your Own License (BYOL) images, 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-related parameters.

   a) Optional: Specify the Name parameter.

   b) Specify the Term parameter.

   You can select **1 Year** or **3 Years**.

   c) Specify the Instance Count parameter.

   The 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. Read and select ECS Terms of Service and click **Purchase**.
9. In the dialog box that appears, confirm that the parameters are correct and click Create Order.

10. Read the payment information and then click Pay.

Result

After you purchase a reserved instance, you can immediately apply billing discounts when the reserved instance matches one or more pay-as-you-go instances. You can also manage reserved instances in response to pay-as-you-go instance changes.

Related tasks

Split a reserved instance

You can split a single reserved instance into multiple reserved instances to match smaller pay-as-you-go instances. For ease of description, the reserved instance to be split is referred to as the original reserved instance. The split reserved instance is referred to as the target reserved instance.

Merge reserved instances

This topic describes how to merge reserved instances. If traffic to your instances increases, you can merge multiple reserved instances into a single reserved instance to match larger pay-as-you-go instances. For ease of description, the reserved instance to be merged is referred to as the original reserved instance. The merged reserved instance is referred to as the target reserved instance.

Change the scope of a reserved instance

You can change the scope of a reserved instance to fit your service requirements. This topic describes how to change the scope of a reserved instance. For ease of description, the reserved instance to be changed is referred to as the original reserved instance. The changed reserved instance is referred to as the target reserved instance.

Related topics

#unique_172

5.4.4 Split a reserved instance

You can split a single reserved instance into multiple reserved instances to match smaller pay-as-you-go instances. For ease of description, the reserved instance to be split is referred to as the original reserved instance. The split reserved instance is referred to as the target reserved instance.

Prerequisites

Before you split a reserved instance, make sure that the following requirements are met:

- An original reserved instance is purchased and is in the Active state.
• No ongoing requests of splitting, merging, or changing the scope of reserved instances exist.

**Context**

Note the following limits when you split, merge, and change the scope of reserved instances:

• You can change only the instance type of a reserved instance. The instance family of a reserved instance cannot be changed.
• You cannot merge, split, or change the scope of reserved instances that match burstable instances.

After you submit a splitting request:

• The original reserved instance will enter the **Processing** state. The status will be automatically refreshed after the splitting 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 the reserved instance is split:

• The target reserved instances will take effect at the top of the hour of the splitting operation. If a target reserved instance matches one or more new pay-as-you-go instances, the billing discount is applied to the matched pay-as-you-go instances within the same hour.
• The original reserved instance will be retired at the top of the hour, and its price is updated to USD 0.
• If the target reserved instances are zonal reserved instances, the type of resources reserved will also be updated automatically.

Assume that you split the ecs.g5.2xlarge zonal reserved instance RI1 into two ecs.g5.xlarge zonal reserved instances RI2 and RI3 at 2019-02-26 13:45:00. At 2019-02-26 13:00:00, the term of RI1 ends and the terms of RI2 and RI3 start. Starting from 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 immediately match ecs.g5.xlarge pay-as-you-go instances after RI2 and RI3 take effect, the billing discounts provided by RI2 and RI3 are also applied to the hourly bills of the pay-as-you-go instances starting from 2019-02-26 13:00:00.

If the original reserved instance fails to be split, the reserved instance remains valid.

**Procedure**
1. Log on to the ECS console.

2. In the left-side navigation pane, choose **Instances & Images > Reserved Instances**.

3. On the **Reserved Instances** page, find the original reserved instance and click **Split** in the **Actions** column.

4. In the **Split Reserved Instance** pane, specify the names, instance types, and counts of the target reserved instances.

   **Note:**
   The total computing power of the target reserved instances must be equal to that of the original reserved instance.

5. Click **OK**.

**Related topics**
#unique_173
#unique_174

### 5.4.5 Merge reserved instances

This topic describes how to merge reserved instances. If traffic to your instances increases, you can merge multiple reserved instances into a single reserved instance to match larger pay-as-you-go instances. For ease of description, the reserved instance to be merged is referred to as the original reserved instance. The merged reserved instance is referred to as the target reserved instance.

**Prerequisites**

Before you merge reserved instances, make sure that the following requirements are met:

- Original reserved instances are purchased and are in the **Active** state.
- No ongoing requests of splitting, merging, or changing the scope of reserved instances exist.
- The original reserved instances have the same expiration date.
- The original reserved instances are purchased with the same currency.
- If these original reserved instances are regional reserved instances, they must belong to the same region. If these original reserved instances are zonal reserved instances, they must belong to the same zone.

**Context**

Note the following limits when you split, merge, and change the scope of reserved instances:
• You can change only the instance type of a reserved instance. The instance family of a reserved instance cannot be changed.

• You cannot merge, split, or change the scope of reserved instances that match burstable instances.

After you submit a merging request:

• The original reserved instance will enter the **Processing** state. The status will be automatically refreshed after the splitting 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 the reserved instances are merged:

• The target reserved instances will take effect at the top of the hour of the splitting operation. If a target reserved instance matches one or more new pay-as-you-go instances, the billing discount is applied to the matched pay-as-you-go instances within the same hour.

• The original reserved instance will be retired at the top of the hour, and its price is updated to USD 0.

• If the target reserved instances are zonal reserved instances, the type of resources reserved will also be updated automatically.

If the reserved instances fail to be merged, they remain valid.

**Procedure**

1. Log on to the ECS console.

2. In the left-side navigation pane, choose **Instances & Images > Reserved Instances**.

3. On the **Reserved Instances** page, find a reserved instance to be merged and click **Merge** in the **Actions** column.

4. In the **Merge Reserved Instances** pane, select the original reserved instances with which you want to merge. Specify the name, instance type, and instance count for the target reserved instance.

**Note:**

The computing power of the target reserved instance must be equal to that of all original reserved instances, and the target reserved instance must be of an existing instance type. For example, two ecs.g5.2xlarge reserved instances can be merged into
one ecs.g5.4xlarge reserved instance, but one ecs.g5.xlarge reserved instance and two ecs.g5.2xlarge RIs cannot be merged into one ecs.g5.5xlarge reserved instance.

5. Click **OK**.

**Related topics**

#unique_173  
#unique_174

### 5.4.6 Change the scope of a reserved instance

You can change the scope of a reserved instance to fit your service requirements. This topic describes how to change the scope of a reserved instance. For ease of description, the reserved instance to be changed is referred to as the original reserved instance. The changed reserved instance is referred to as the target reserved instance.

**Prerequisites**

Before you change the scope of a reserved instance, make sure that the following requirements are met:

- An original reserved instance is purchased and is in the **Active** state.
- No ongoing requests of splitting, merging, or changing the scope of reserved instances exist.

**Context**

Note the following limits when you split, merge, and change the scope of reserved instances:

- You can change only the instance type of a reserved instance. The instance family of a reserved instance cannot be changed.
- You cannot merge, split, or change the scope of reserved instances that match burstable instances.

You can make one of the following changes to the scope of a reserved instance:

- From a zone to a region
- From a region to a zone
- From one zone to another within the same region

You cannot change the scope of a reserved instance across regions. For example, if you have a zonal reserved instance in Hangzhou Zone B, you can change the scope of the reserved instance to another zone or change the reserved instance to a regional reserved
instance in the China (Hangzhou) region. However, you cannot change the reserved instance to a regional or zonal reserved instance in another region.

After you submit a scope change request:

- The original reserved instance will enter the **Processing** state. The status will be automatically refreshed after the splitting 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 the scope of the reserved instance is changed:

- The target reserved instances will take effect at the top of the hour of the splitting operation. If a target reserved instance matches one or more new pay-as-you-go instances, the billing discount is applied to the matched pay-as-you-go instances within the same hour.
- The original reserved instance will be retired at the top of the hour, and its price is updated to USD 0.
- If the target reserved instances are zonal reserved instances, the type of resources reserved will also be updated automatically.

If the scope of the reserved instance fails to be changed, the original reserved instance remains valid.

**Procedure**

1. Log on to the **ECS console**.
2. In the left-side navigation pane, choose **Instances & Images > Reserved Instances**.
3. On the **Reserved Instances** page, find the original reserved instance and click **Modify** in the **Actions** column.
4. In the **Modify Reserved Instance** pane, change the scope of the reserved instance.
5. Click **OK**.

**Related topics**

#unique_173
#unique_174

### 5.4.7 View the usage details of a reserved instance

After you purchase a reserved instance (RI), you can view its matching pay-as-you-go instances and usage details in the ECS console. The bills of pay-as-you-go instances that
are offset by RIs are refreshed every hour. This topic describes how to view the usage details of an RI.

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Reserved Instances.
3. Find the target RI and click View Bill in the Actions column.
4. On the page that appears, set the search conditions and click Search.

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 x 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) x 60 (remaining days) x 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 ECS instance by using the wizard in the ECS console. To create an ECS instance, you must specify the instance type, image, storage, network, and security group. The wizard provides a variety of extended configuration functions to meet your personalized deployment and management requirements.

Prerequisites

You must complete the following preparations to create an ECS instance:
1. Create an account and complete the account information.
   - Sign up with Alibaba Cloud.
   - Add a payment method.
   - To purchase ECS instances in mainland China regions, you must complete real-name verification. For more information, see Real-name registration FAQs.

2. Alibaba Cloud provides a default Virtual Private Cloud (VPC). If you do not want to use the VPC that is provided, you can also create a VPC and a VSwitch in the target region. For more information about how to create a VPC, see #unique_184.

3. Alibaba Cloud provides a default security group. If you do not want to use the security group that is provided, you can also create a security group in the target region where the instance is created. For more information about how to create a security group, see #unique_185.

If you need other extended functions, you must complete corresponding preparations:

- To specify an SSH key pair when creating a Linux instance, you must create an SSH key pair in the target region. For more information about how to create an SSH key pair, see #unique_186.
- To configure user data, you must first prepare user data. For more information about how to prepare user data, see User data.
- To associate an ECS instance with an instance RAM role, you must create the instance RAM role, assign a permission policy to the role, and bind the role to the instance. For more information, see #unique_187.

Procedure

1. Go to the ECS Custom Launch page.

2. Perform the following steps to complete Basic Configurations:
   a) Select a Billing Method: Subscription, Pay-As-You-Go, or Preemptible Instance.
For more information about how to create a preemptible instance, see Create a preemptible instance.

b) Select a region and zone.

By default, a zone is randomly assigned by the system. You can select a zone that better meets your business needs. For more information about how to select a region and zone, see Regions and zones.

Note:
You cannot change the region or zone after the instance is created.

c) Select an instance type and specify the number of instances.

Instance types that are available are determined by the region you select. 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 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-grade 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.
- To use an SSD disk, select an I/O optimized instance.

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 SSH key pair, select a Linux image.
- To configure user data, select an image by following the instructions provided in User data.
- Public images contain only an initial system environment. You can find more images in Alibaba Cloud 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 and instance type.
  - Size: The default size of the system disk is 40 GiB. If the selected image file is larger than 40 GiB, the size value is increased to the size of the image file. The minimum size of the system disk is related to the image. The actual size is displayed on the buy page.

<table>
<thead>
<tr>
<th>Image</th>
<th>Range of the system disk size (GiB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux (excluding CoreOS and Red Hat)</td>
<td>[max{20, Image file size}, 500]</td>
</tr>
<tr>
<td>FreeBSD</td>
<td>[max{30, Image file size}, 500]</td>
</tr>
<tr>
<td>CoreOS</td>
<td>[max{30, Image file size}, 500]</td>
</tr>
<tr>
<td>Red Hat</td>
<td>[max{40, 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 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 data disks that are added 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.

3. 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. Public IP addresses that are assigned this way cannot be detached from the instance. For more information about the billing methods of Internet bandwidth, see Billing methods of Internet bandwidth.

      • 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 associate an EIP with or disassociate an EIP from an instance at any time you want.

   c) Select a security group.

      If you have not created any security groups, you can use the default security group. For more information about the rules of the default security group, see #unique_190.

   d) Add an ENI.

      If the instance type that you selected 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 ENI from the instance.
4. Optional: Click **Next: System Configurations** to make the following configurations:

a) Select and set logon credentials.
   
   Select a credential based on the image:
   
   - Linux: You can select a password or an SSH key pair as the logon credential.
   - Windows: You can only select a password as the logon credential.
   
   You can also set the logon credential for an instance after the instance is created. For more information, see [Reset the logon password of an instance](#unique_194).

b) Specify the instance name you want to display in the ECS console, and the hostname 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.

5. Optional: Click **Next: Grouping** to group the instance you have created.

a) Add tags.
   
   If you have created multiple instances, you can use tags for better management. For more information, see [Tags](#unique_194).

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. This can ensure high availability of services and the disaster recovery capability of the infrastructure. For more information, see [Deployment Sets](#unique_93).

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 [Dedicated Hosts](#unique_93).
6. Confirm the order.

a) In the **Configurations Selected** section, confirm all the configurations. You can also click the edit icon to change the configurations.

- Optional. Click **Save as Launch Template** to save your configurations as a launch template that can be used for later. For more information, see [Launch templates](#).
- 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. On the right side, the programming language-specific SDK examples are provided. [Java](#) and [Python](#) examples are available. For more information, see [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 the 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>Billing method of Internet bandwidth</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. The configuration fee includes 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 fee, 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 fee, 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. The configuration fee includes 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**.
7. Confirm instance creation based on the instance billing method.
   - Subscription instance: Click Create Order.
   - Pay-as-you-go instance: Click Create Instance.

Result
After the instance is activated, click Console to view the instance details in the ECS 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 #unique_197.
- To secure your instance after creation, we recommend that you perform security compliance inspection and configuration:
  - For Linux instances, go to the Security Advisories page and see Harden operating system security for Linux.
  - For Windows 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_198 and #unique_199.

6.3 Create an ECS instance by using a custom image
This topic describes how to use a custom image to create an ECS instance. You can use a custom image to create an ECS instance that has the same operating system, applications, and data as those of the custom image to improve efficiency.

Prerequisites
A custom image is created under the account and region where you want to create an instance.

Context
If you do not have a custom image in the account and region where you want to create an instance, you can use one of the following solutions.
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<table>
<thead>
<tr>
<th>Scenario</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>You have an image on the local device.</td>
<td>Import the local image to Alibaba Cloud as a custom image. For more information, see #unique_200.</td>
</tr>
<tr>
<td>You do not have custom images but have an instance as a template.</td>
<td>#unique_201.</td>
</tr>
<tr>
<td>You do not have custom images but have a snapshot as a template.</td>
<td>#unique_202.</td>
</tr>
<tr>
<td>You have a custom image in another region.</td>
<td>Copy the custom image to the region where you want to create an instance. For more information, see #unique_203.</td>
</tr>
<tr>
<td>You have a custom image in another account.</td>
<td>Share the custom image to the account under which you want to create an instance. For more information, see #unique_204.</td>
</tr>
</tbody>
</table>

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, choose Instances & Images > Images.
3. In the top navigation bar, select a region.
4. Based on the image source, use one of the following methods to go to the Images page:
   - Custom image created or exported: Go to the Custom Images tab.
   - Custom image obtained by copying: Go to the Custom Images tab.
   - Custom image obtained by sharing: Go to the Shared Images tab.
5. Find the image that you want to use. Click Create Instance in the Actions column.
6. Configure the parameters and create the instance.

   Information of the region and image sections is automatically filled. Configure other parameters based on your needs. For more information, see Create an instance by using the provided wizard.

Note:

If the selected custom image contains one or more data disk snapshots, an equal number of data disks are automatically created from these snapshots. Each disk has the same size as the snapshot from which the disk is created. You can increase the size of a data disk but cannot decrease it.
6.4 Purchase an ECS instance of the same configuration

You can purchase an ECS instance that has the same configuration as that of your existing instance. This allows you to improve the efficiency of creating ECS instances.

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 instance and choose More > Buy Same Type in the Actions column.
5. Confirm the configuration that is automatically selected.
   You can modify the configuration that is automatically selected. After you modified the configuration, you can click Compare the original configuration in the lower part of the page to view the same and different configurations.
   - Subscription instance: Specify the duration and whether to enable auto-renewal.
   - Pay-as-you-go instance: Specify whether to enable automatic release. If you enabled automatic release, you must specify when to release the instance.
7. Read and select ECS Terms of Service.
8. Confirm instance creation based on the billing method.
   - Subscription instance: Click Create Order.
   - Pay-as-you-go instance: Click Create Instance.

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.

### 6.6 Instructions for purchase

This topic describes the information that you must know when you purchase ECS instances.

**Resource upgrades**

For information about how to upgrade ECS instances, see Overview of instance upgrade and downgrade. Before you upgrade ECS instances, take note of the following items:
• 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 the instances are running. You can also downgrade ECS instances based on your business needs.
• A maximum of 16 data disks can be attached to each ECS instance. You cannot reduce the size of a data disk after it has been extended.
• The bandwidth of each ECS instance is measured in Mbit/s and ranges from 0 to 200 Mbit/s. You can temporarily upgrade the bandwidth of an ECS instance, or downgrade the instance when you renew it.

References

The following topics describe the basic terms of ECS and how to use ECS:

• For the terms and services related to ECS, see #unique_209.
• For information about how to select ECS instance families, see Instance families.
• For information about how to select images, see #unique_138.
• For the performance of Block Storage devices, see #unique_210.
• For usage precautions on ECS instances, see #unique_211.
• For the features of pay-as-you-go resources, see Pay-as-you-go.
• For the features of subscription resources, see Subscription.
• For the limits that apply to ECS, see #unique_157.
• If you want to select instance types based on their benchmark data for compute-intensive performance, contact the Service Manager or see Submit a ticket to contact Alibaba Cloud after-sales support.
7 Connect to instances

7.1 Overview

You can choose from a variety of tools such as VNC and third-party client tools to connect to ECS instances. Select a suitable tool to connect to ECS instances based on the operating systems of the instances, the operating system of your local machine, and the operations that you want to perform.

Connection methods

<table>
<thead>
<tr>
<th>Instance operating system</th>
<th>Operating system of your local machine</th>
<th>Connection method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux</td>
<td>Windows</td>
<td>• Use VNC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For more information, see Connect to a Linux instance from the console.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use client tools such as PuTTY</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- For information about how to connect to an instance by using an SSH key pair as the credential, see Use key pairs in Windows.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- For information about how to connect to an instance by using a password as the credential, see Use a username and password for authentication on a Windows device.</td>
</tr>
<tr>
<td>Instance operating system</td>
<td>Operating system of your local machine</td>
<td>Connection method</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------</td>
<td>-------------------</td>
</tr>
</tbody>
</table>
| Unix-like operating systems including Linux and macOS | • Use VNC  
For more information, see [Connect to a Linux instance from the console](#).  
• Use SSH commands  
  - For information about how to connect to an instance by using an SSH key pair as the credential, see [Use key pairs in operating systems that support SSH commands](#) (configured by using commands).  
  - For information about how to connect to an instance by using a password as the credential, see [Use a username and password for authentication on a Linux or Mac OS X device](#). | |
| Operating systems of mobile devices, including iOS and Android | Use an app such as SSH Control Lite or JuiceSSH  
For more information, see [Connect to a Linux instance from a mobile device](#). | |
| Windows | Windows | • Use VNC  
For more information, see [Connect to a Windows instance from the console](#).  
• Use a client tool such as Remote Desktop Connection (formerly called MSTSC)  
For more information, see [Windows OS](#). |
| Linux | • Use VNC  
For more information, see [Connect to a Windows instance from the console](#).  
• Use a client tool such as rdesktop  
For more information, see [Linux](#). | |
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Instance operating system / 7 Connect to instances

<table>
<thead>
<tr>
<th>Instance operating system</th>
<th>Operating system of your local machine</th>
<th>Connection method</th>
</tr>
</thead>
<tbody>
<tr>
<td>macOS</td>
<td>• Use VNC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For more information, see Connect to a Windows instance from the console.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Use a client tool such as Microsoft Remote Desktop Connection for Mac</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For more information, visit Get started with the macOS client.</td>
<td></td>
</tr>
</tbody>
</table>

Operating systems of mobile devices, including iOS and Android

<table>
<thead>
<tr>
<th>Item</th>
<th>VNC</th>
<th>Third-party client tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocation of a public IP address or an Elastic IP address to the target instance</td>
<td>Optional. VNC can be used to troubleshoot exceptions including network misconfigurations (for example, firewall being enabled by mistake).</td>
<td>Required.</td>
</tr>
<tr>
<td>Item</td>
<td>VNC</td>
<td>Third-party client tool</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Enabling services including SSH on the target instance</td>
<td>Optional. VNC can be used to troubleshoot exceptions including SSH service exceptions (for example, SSHD being disabled).</td>
<td>Required.</td>
</tr>
<tr>
<td>Logon through the ECS console</td>
<td>Supported.</td>
<td>Not supported. The local client must be installed.</td>
</tr>
<tr>
<td>Independence of the target instance operating system</td>
<td>VNC can be used to connect to both Linux and Windows instances.</td>
<td>Third-party client tools can be used to connect to Linux or Windows instances, depending on what client tool is used.</td>
</tr>
<tr>
<td>Simultaneous logons by multiple operating system users to a single instance</td>
<td>Not supported.</td>
<td>Depends on the client tool.</td>
</tr>
<tr>
<td>Ease of interaction</td>
<td>VNC does not support directly copying and pasting text. To copy and paste text, use the function of copying long commands.</td>
<td>Depends on the client tool.</td>
</tr>
<tr>
<td>Visually viewing Linux system file resources</td>
<td>Not supported.</td>
<td>Depends on the client tool.</td>
</tr>
<tr>
<td>Permissions to control and modify hardware</td>
<td>Supported. VNC can be used to manage resources including BIOS and troubleshoot exceptions including system startup failure.</td>
<td>Not supported.</td>
</tr>
</tbody>
</table>
### 7.2 Connect to Linux instances

#### 7.2.1 Connect to a Linux instance from the console

If you cannot connect to your Linux instance by using the remote connection software such as PuTTY, Xshell, and SecureCRT, you can use the management terminal VNC in the ECS console to connect to the Linux instance and view the real-time status of the instance in the ECS operation interface.

**Prerequisites**

- You have created an instance.
- You have set a logon password for the instance. If not, you can reset the password for the instance. For more information, see [Reset the logon password of an instance](#).

**Context**

The remote connection password is used to connect to the management terminal in the ECS console, while the instance password is used to log on to the instance.

If you cannot connect to the instance by using software, you can connect to the instance through the management terminal VNC. For example, you can do this in the following scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instance started slowly due to startup</td>
<td>Check the progress of the self-check.</td>
</tr>
<tr>
<td>The firewall of the operating system is</td>
<td>Disable the firewall.</td>
</tr>
<tr>
<td>enabled by mistake.</td>
<td></td>
</tr>
<tr>
<td>The ECS instance is hacked into and causes</td>
<td>Troubleshoot and terminate abnormal</td>
</tr>
<tr>
<td>a high CPU utilization rate and high bandwidth</td>
<td>processes.</td>
</tr>
<tr>
<td>usage.</td>
<td></td>
</tr>
</tbody>
</table>

**Procedure**

The following figure shows the workflow.
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. On the **Instances** page, click **Connect** in the **Actions** column corresponding to the instance that you want to connect to.

5. Connect to the management terminal.
   
   • If you use the Alibaba Cloud account to connect to the management terminal for the first time, perform the following operations:
     
   a. In the **VNC Password** dialog box, copy the password.
The VNC password is displayed only once at the time when you connect to the management terminal for the first time. Keep the password properly.

b. Click Close.

c. In the Enter VNC Password dialog box that appears, paste the password and click OK.

- If you forget your password or connect to the management terminal for the first time as a RAM user, perform the following operations:

  a. Modify the VNC password.
  b. In the upper-left corner of the interface, choose Send Remote Call > Connect VNC.
  c. In the Enter VNC Password dialog box that appears, enter the new password.
  d. Click OK.

- If you connect to the management terminal once more by using your Alibaba Cloud account or as a RAM user, perform the following operations:

  In the Enter VNC Password dialog box, enter the password and click OK.

6. Enter the username root and press the Enter key.

7. Enter the instance logon password and press the Enter key.

   In the upper-left corner of the interface, choose Send Remote Call > CTRL+ALT+Fx (You can press function keys 1 to 10) to switch between different management terminals for connecting to the Linux instance. A persistent black screen indicates that the instance is in sleep mode. Press any key to wake up the system.

**Note:**

When you log on to the Linux instance, the password characters are not displayed as you type. Press the Enter key after you type the password.

Modify the VNC password

When you connect to the management terminal as a RAM user for the first time, you must modify the VNC password. You can also change the password when you forget or need to update the VNC password.

**Note:**

After modifying the VNC password for a non-I/O optimized instance, you must restart the instance in the ECS console for the new password to take effect. Restarting the instance will stop your instance, which will lead to service interruption. Proceed with caution.
1. On the **Instances** page, click **Connect** in the **Actions** column corresponding to the instance that you want to connect to.

2. Close the **VNC Password** dialog box or the **Enter VPC Password** dialog box.

3. In the upper-right corner of the interface, click **Modify VNC Password**.

4. In the **Modify VNC Password** dialog box, enter and confirm the new password, and then click **OK**.

5. Optional: If the instance is a non-I/O optimized instance, restart the instance.
   For more information, see **Restart an instance**.

**Copy long commands**

If you need to copy a long text item such as a download URL from the local device to the instance, you can use the copy command input function.

1. On the **Instances** page, click **Connect** in the **Actions** column corresponding to the instance that you want to connect to.

2. Connect to the management terminal.

3. In the upper-right corner of the interface, click **Enter Copy Commands**.

4. In the **Copy and Paste Commands** dialog box that appears, enter the content to be copied and then click **OK**.

**Related tasks**

- **Connect to a Linux instance by using an SSH key pair**
  SSH key pairs are a secure and convenient method for logon authentication. This topic describes how to use an SSH key pair to connect to a Linux instance from a client that supports SSH commands.

- **Connect to a Linux instance by using a username and password**
  This topic describes how to use a username and password to connect to a Linux instance from a Windows, Linux, Mac OS X, Android, or iOS device.

- **Connect to a Linux instance from a mobile device**
This topic describes how to use a username and password to connect to a Linux instance from an iOS or Android mobile device.

### 7.2.2 Connect to a Linux instance by using an SSH key pair

SSH key pairs are a secure and convenient method for logon authentication. This topic describes how to use an SSH key pair to connect to a Linux instance from a client that supports SSH commands.

**Prerequisites**

- You have created an SSH key pair and downloaded the .pem private key file. For more information, see #unique_186.
- You have created an instance.
- You have bound a key pair to the instance.
- You have allocated a public IP address or an Elastic IP (EIP) address to the instance.
- The instance is in the Running state.
- You have added security group rules to the security group to which the instance belongs to allow access over the corresponding port, such as the default port 22 for SSH. For more information, see #unique_108.

<table>
<thead>
<tr>
<th>Network type</th>
<th>NIC type</th>
<th>Direction</th>
<th>Authorization policy</th>
<th>Protocol type</th>
<th>Port range</th>
<th>Priority</th>
<th>Authorization type</th>
<th>Authorization object</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>1</td>
<td>IPv4 CIDR block</td>
<td>0.0.0.0/0</td>
</tr>
<tr>
<td>Classic network</td>
<td>Internet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Use key pairs in Windows**

The following section uses PuTTYgen as an example to introduce how to convert the private key file format from .pem to .ppk. The section also describes how to use an SSH key pair to connect to a Linux instance.

1. Download and install PuTTYgen and PuTTY.

The download links are as follows:

- [PuTTYgen](#)
- [PuTTY](#)
2. Convert the private key file format from .pem to .ppk.

   a) Start PuTTYgen.

      In this example, PuTTYgen 0.71 is used.

   b) Set **Type of key to generate** to **RSA** and click **Load**.

   ![PuTTY Key Generator](image)

   c) Select **All Files**.
d) Select the .pem private key file that you want to convert.

e) In the dialog box that appears, click OK.

f) Click **Save private key**.

g) In the dialog box that appears, click **Yes**.

h) Specify the name of the .ppk private key file and click **Save**.

3. Start PuTTY.
4. Configure the private key file that is used for authentication.
   
a) Choose **Connection > SSH > Auth**.

b) Click **Browse**....

c) Select the .ppk private key file that has been converted.
5. Configure the required parameters to connect to a Linux instance.
   a) Click **Session**.
   b) In **Host Name (or IP address)**, enter the account and public IP address of the instance.
      The format is **root@IP address**, such as root@10.10.xx.xxx.
   c) In **Port**, enter the port number **22**.
   d) Set **Connection type** to **SSH**.
6. Click **Open**.

If the following message appears, you have logged on to the instance by using the SSH key pair.

```
Using username "root".  
Authenticating with public key "---BEGIN PUBLIC KEY---" 
Last login: [redacted] [redacted] [redacted] [redacted]
Welcome to Alibaba Cloud Elastic Compute Service!
[root@--- redacted]# 
```

**Use key pairs in operating systems that support SSH commands (configured by using commands)**

The following section describes how to use commands to configure the required parameters from a client that supports SSH commands. The section also describes how to use SSH commands to log on to a Linux instance.

1. Find the path where the `.pem` private key file is stored, such as `~/.ssh/ecs.pem`.

   The path and file name are only for reference. Modify the information based on your actual needs.
2. Run the following command to modify the attribute of the private key file:

```bash
chmod 400 [Path of the .pem private key file on your local PC]
```

Example:

```bash
chmod 400 ~/.ssh/ecs.pem
```

3. Run the following command to connect to the instance:

```bash
ssh -i [Path for the .pem private key file on your local PC] root@[Public IP address]
```

Example:

```bash
ssh -i ~/.ssh/ecs.pem root@10.10.xx.xxx
```

**Use key pairs in operating systems that support SSH commands (configured by using the config file)**

The following section describes how to use the config file to configure the required parameters from a client that supports SSH commands. The section also describes how to use SSH commands to connect to a Linux instance.

1. Go to the .ssh directory under the root directory and modify the config file by using the following method:

   `~/.ssh/ecs.pem` is the path of the private key file on your local PC.

   ```
   Host ecs    // Enter the name of the ECS instance.
   HostName 192.168.64.100   // Enter the public IP address of the ECS instance.
   Port 22   // Enter the port number. The default port number is 22.
   User root   // Enter the logon account.
   IdentityFile ~/.ssh/ecs.pem // Enter the path of the .pem private key file on the local PC.
   ```

2. Save the config file.

3. Restart SSH.

4. Run the following command to connect to the instance:

   ```bash
   ssh [Name of the ECS instance]
   ```

Example:

```bash
ssh ecs
```

**Related tasks**

*Connect to a Linux instance from the console*

If you cannot connect to your Linux instance by using the remote connection software such as PuTTY, Xshell, and SecureCRT, you can use the management terminal VNC in the ECS.
console to connect to the Linux instance and view the real-time status of the instance in the
ECS operation interface.

Connect to a Linux instance by using a username and password
This topic describes how to use a username and password to connect to a Linux instance
from a Windows, Linux, Mac OS X, Android, or iOS device.

7.2.3 Connect to a Linux instance by using a username and password
This topic describes how to use a username and password to connect to a Linux instance
from a Windows, Linux, Mac OS X, Android, or iOS device.

Prerequisites

- You have created an instance.
- You have set a logon password for the instance.
- You have allocated a public IP address or an Elastic IP (EIP) address to the instance.
- The instance is in the Running state.
- You have added security group rules to the security group to which the instance belongs
to allow access over the corresponding port. For more information, see #unique_108.

<table>
<thead>
<tr>
<th>Network type</th>
<th>NIC type</th>
<th>Direction</th>
<th>Authorization policy</th>
<th>Protocol type</th>
<th>Port range</th>
<th>Priority</th>
<th>Authorization type</th>
<th>Authorization object</th>
</tr>
</thead>
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<tr>
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<td>Allow</td>
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</tr>
<tr>
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<td>SSH (22)</td>
<td>22/22</td>
<td>1</td>
<td>IPv4</td>
<td>0.0.0.0/0</td>
</tr>
</tbody>
</table>

Context

You can use one of the following methods to connect to a Linux instance by using the
username and password based on the operating system of your device:

- Use a username and password for authentication on a Windows device
- Use a username and password for authentication on a Linux or Mac OS X device
- Use a username and password for authentication on an Android or iOS device

Use a username and password for authentication on a Windows device

The following section uses PuTTY as an example to introduce how to use a username and
password to connect to a Linux instance
1. Download and install PuTTY.
   Download PuTTY from PuTTY.

2. Start PuTTY.

3. Configure the required parameters to connect to a Linux instance.
   - **Host Name (or IP address)**: Specify the public IP address or EIP of the instance.
   - **Port**: Enter the port number 22.
   - **Connection Type**: Select SSH.
   - **Saved Sessions**: optional. Enter an identifiable name and click Save to save the session. Saved sessions store session information so you do not need to enter session information such as the public IP address when you log on to the instance again.

4. Click Open.

   When you connect to the instance for the first time, the message PuTTY Security Alert appears, indicating that PuTTY cannot confirm the authenticity of the remote server and can provide only the public key fingerprint of the server. Select Yes to indicate that
you trust this server. PuTTY will add the public key fingerprint to the registry of the on-premises device.

**Note:**
If the message **PuTTY Security Alert** appears again when you log on later, the instance may suffer **man-in-the-middle attacks**. For more information, visit **PuTTY User Manual**.

5. Specify the username (as root by default) and press the Enter key.

6. Specify the logon password of the instance and press the Enter key.

When you log on to the Linux instance, the password characters are not displayed as you type.

If the message **Welcome to Alibaba Cloud Elastic Compute Service** appears, the connection to the instance is successful.
Use a username and password for authentication on a Linux or Mac OS X device

1. Enter the following SSH command:

   ssh root@<Public IP address or EIP of the instance>

   Example:

   ssh root@47.99.XX.XX

2. Enter the logon password of the instance.

   If the message Welcome to Alibaba Cloud Elastic Compute Service! appears, the connection to the instance is successful.

Use a username and password for authentication on an Android or iOS device

For more information, see Connect to a Linux instance from a mobile device.

References
Connect to a Linux instance from the console
If you cannot connect to your Linux instance by using the remote connection software such as PuTTY, Xshell, and SecureCRT, you can use the management terminal VNC in the ECS console to connect to the Linux instance and view the real-time status of the instance in the ECS operation interface.

Connect to a Linux instance by using an SSH key pair
SSH key pairs are a secure and convenient method for logon authentication. This topic describes how to use an SSH key pair to connect to a Linux instance from a client that supports SSH commands.

7.2.4 Connect to a Linux instance from a mobile device

This topic describes how to use a username and password to connect to a Linux instance from an iOS or Android mobile device.

Prerequisites

- You have created an instance.
- You have set a logon password for the instance.
- You have allocated a public IP address or an Elastic IP (EIP) address to the instance.
- The instance is in the Running state.
You have added security group rules to the security group to which the instance belongs to allow access over the corresponding port. For more information, see #unique_108.

<table>
<thead>
<tr>
<th>Network type</th>
<th>NIC type</th>
<th>Direction</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Context**

You can use one of the following methods to connect to a Linux instance based on the operating system of your mobile device:

- Use SSH Control Lite to connect to a Linux instance from an iOS device
- Use JuiceSSH to connect to a Linux instance from an Android device

**Use SSH Control Lite to connect to a Linux instance from an iOS device**

In this example, a username and password is used for authentication.

1. Download SSH Control Lite.
2. Start SSH Control Lite.
3. In the lower part of the page, tap Hosts.
4. In the upper-left corner of the page, tap the + icon.
5. Tap **Connection**.
6. Configure the connection parameters and tap **Save**.

- **Name**: Specify the host name. In this example, **DocTest** is used.
- **Protocol**: Use the default value **SSH**.
- **Host**: Specify the public IP address or EIP of the Linux instance to which you want to connect.
- **Port**: Enter the port number **22**.
- **Username**: Enter the username **root**.
- **Password**: Enter the password to log on to the instance.
7. In the lower part of the page, tap Remote Controls.
8. In the upper-left corner of the page, tap the + icon.

Create a remote connection session. In this example, the session name is specified as **New remote**.
9. Tap **Host1**.

10. Tap **Bind**.
11. Select the newly added Linux instance.

In this example, **DocTest** is used.
12. In the upper-right corner of the page, tap **Done**. When **Edit** is displayed in the upper-right corner of the page, tap **DocTest**.
13. Tap Connect.

14. Select Yes, Once or Yes, Permanently.

If the connection is successful, the indicator icon next to DocTest becomes green.
15. Tap **DocTest**.

16. Tap **Console** to go to the Linux instance management page.

You have connected to the Linux instance.
Use JuiceSSH to connect to a Linux instance from an Android device

In this example, a username and password is used for authentication.

1. Install JuiceSSH.
2. Start JuiceSSH.
3. Tap **Connections**.

![JuiceSSH](image)

**Connections**
Manage your connections

**Frequently Used**
Your most used connections

Welcome
You've not connected to any servers yet.
Hit Connections above to get started.

**Plugins**
Extend JuiceSSH with 3rd party extensions

**Unlock Pro Features**
Learn more about pro features

**Settings**
4. Tap the + icon.

No Connections
You do not currently have any connections configured. Use the button below to get started.
5. Configure the connection parameters and tap the icon.

- **Nickname**: Specify the session name. In this example, **DocTest** is used.
- **Type**: Use the default value **SSH**.
- **Address**: Specify the public IP address or EIP of the Linux instance to which you want to connect.
- **Set Identity**.

  a. Tap **Identity** and select **New** from the drop-down list.
  
  b. Specify the following parameters and tap the icon.

    - **NickName**: optional. You can specify an identity name based on your management needs. In this example, **DocTest** is used.
    - **Username**: Enter the username **root**.
    - **Password**: Tap **SET(OPTIONAL)** and enter the password to log on to the instance.

- **Port**: Enter the port number **22**.
6. Read the prompt and tap **ACCEPT**.
7. Optional: When you connect to the instance for the first time, a message appears to remind you to set information such as font. Read the information and tap **OK - I'VE GOT IT!**.

You have connected to the Linux instance.
Related concepts

Overview

You can choose from a variety of tools such as VNC and third-party client tools to connect to ECS instances. Select a suitable tool to connect to ECS instances based on the operating systems of the instances, the operating system of your local machine, and the operations that you want to perform.

7.3 Connect to Windows instances

7.3.1 Connect to a Windows instance from the console

If you cannot connect to a Windows instance by using remote connection software such as RDP and rdesktop, you can use the management terminal VNC in the ECS console to connect to the instance and view the real-time status of the instance in the ECS operation interface.

Prerequisites

- You have created an instance.
- You have set a logon password for the instance. If not, you can reset the password for the instance. For more information, see Reset the logon password of an instance.
**Context**

The remote connection password is used to connect to the management terminal in the ECS console, while the instance password is used to log on to the instance.

If you cannot connect to the instance by using software, you can connect to the instance through the management terminal VNC. For example, you can do this in the following scenarios:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instance started slowly due to startup self-check.</td>
<td>Check the progress of the self-check.</td>
</tr>
<tr>
<td>The firewall of the operating system is enabled by mistake.</td>
<td>Disable the firewall.</td>
</tr>
<tr>
<td>The ECS instance is hacked into and causes a high CPU utilization rate and high bandwidth usage.</td>
<td>Troubleshoot and terminate abnormal processes.</td>
</tr>
</tbody>
</table>

**Procedure**

The following figure shows the workflow.

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. On the **Instances** page, click **Connect** in the **Actions** column corresponding to the instance that you want to connect to.
5. Connect to the management terminal.

- If you use the Alibaba Cloud account to connect to the management terminal for the first time, perform the following operations:
  
  a. In the **VNC Password** dialog box, copy the password.

  **Note:**
  
  The VNC password is displayed only once at the time when you connect to the management terminal for the first time. Keep the password properly.

  b. Click **Close**.

  c. In the **Enter VNC Password** dialog box that appears, paste the password and click **OK**.

- If you forget your password or connect to the management terminal for the first time as a RAM user, perform the following operations:

  a. **Modify the VNC password**.

  b. In the upper-left corner of the interface, choose **Send Remote Call > Connect VNC**.

  c. In the **Enter VNC Password** dialog box that appears, enter the new password.

  d. Click **OK**.

- If you connect to the management terminal once more by using your Alibaba Cloud account or as a RAM user, perform the following operations:

  In the **Enter VNC Password** dialog box, enter the password and click **OK**.

6. In the upper-left corner of the **Management Terminal** page, choose **Send Remote Call > CTRL+ALT+DELETE** to go to the logon interface of your Windows instance.

7. Select the user account.

   By default, the Administrator account is used.

8. Enter the logon password of the instance and click the logon button.

   For example, the logon button for Windows Server 2008 R2 is [image].

**Modify the VNC password**

When you connect to the management terminal as a RAM user for the first time, you must modify the VNC password. You can also change the password when you forget or need to update the VNC password.
Note:
After modifying the VNC password for a non-I/O optimized instance, you must restart the instance in the ECS console for the new password to take effect. Restarting the instance will stop your instance, which will lead to service interruption. Proceed with caution.

1. On the Instances page, click Connect in the Actions column corresponding to the instance that you want to connect to.
2. Close the VNC Password dialog box or the Enter VPC Password dialog box.
3. In the upper-right corner of the interface, click Modify VNC Password.
4. In the Modify VNC Password dialog box, enter and confirm the new password, and then click OK.
5. Optional: If the instance is a non-I/O optimized instance, restart the instance.
   For more information, see Restart an instance.

Copy long commands
If you need to copy a long text item such as a download URL from the local device to the instance, you can use the copy command input function.

1. On the Instances page, click Connect in the Actions column corresponding to the instance that you want to connect to.
2. Connect to the management terminal.
3. In the upper-right corner of the interface, click Enter Copy Commands.
4. In the Copy and Paste Commands dialog box that appears, enter the content to be copied and then click OK.

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.

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.

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.
   b. Type the public IP address or EIP address of the instance.
   c. Type the user name. The default user name is Administrator.

   ![Remote Desktop Connection](image)

   **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**.
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.

```
rdesktop -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 : local.</td>
</tr>
<tr>
<td></td>
<td>• Open the U Disk: -r disk:usb=/mnt/usbdevice.</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 pasteing.</td>
</tr>
<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:

<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>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>

**Procedure**

Check that you have installed Microsoft Remote Desktop (RD).
1. Start the RD Client. In the upper right corner, click +.

![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, 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_152](#).

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.

   **Note:**
To disable the **No Fees for Stopped Instances (VPC-Connected)** feature, see #unique_152.

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_164 API action through the Alibaba Cloud CLI, OpenAPI Explorer, or Alibaba Cloud SDK.

### 8.2 Stop an instance

This topic describes how to stop an instance in the ECS console and introduces operations related to the No Fees for Stopped Instances (VPC-Connected) feature.

**Prerequisites**

The instance that you want to stop is in the **Running** state.

**Context**

Stopping a subscription instance does not affect the billing of the instance.
Stopping a pay-as-you-go instance may affect the billing of the instance. The impact is determined by the network type of the instance and the **No Fees for Stopped Instances (VPC-Connected)** feature setting.

- Pay-as-you-go instances in classic networks do not support the **No Fees for Stopped Instances (VPC-Connected)** feature. A pay-as-you-go instance in a classic network continues to incur fees while the instance is stopped. Billing stops only when the instance is released. For more information, see [Release an instance](#)

- Pay-as-you-go instances in VPCs support the **No Fees for Stopped Instances (VPC-Connected)** feature.

  - If the **No Fees for Stopped Instances (VPC-Connected)** feature is not enabled, the billing of a pay-as-you-go instance continues while the instance is stopped.

  - If the **No Fees for Stopped Instances (VPC-Connected)** feature is enabled, you can use the Stop Mode parameter to configure whether to retain and bill an instance while it is stopped. If you set Stop Mode to No Charges After Instance Is Stopped in the Stop Instance dialog box, billing of the vCPUs, memory, and public IP address stops while the instance is stopped. However, you are still billed for other resources. For more information, see [unique_152](#).

### Note:
Stopping an instance disrupts services that run on it. Use caution when performing this operation.

**Stop a subscription instance**

To stop a subscription instance, perform the following 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. Stop instances as needed.

   - To stop a single instance, find the instance and in the **Actions** column, choose **More > Instance Status > Stop**.

   - To stop multiple instances, select the instances and click **Stop** in the lower-left corner of the instance list.
5. In the Stop Instance dialog box that appears, set **Stopped By**.

- **Stop**: Stop the instance by shutting it down properly.
- **Force Stop**: Forcibly stop the instance. Forcible stop is equivalent to a physical shutdown, and may cause data loss if instance data has not been written to disks.

6. Click **OK**.

**Stop a pay-as-you-go instance**

To stop a pay-as-you-go instance, perform the following steps:

**Note:**
Stopping an instance disrupts services that run on it. Use caution when performing this operation. The process to stop a preemptible instance is the same as that of a pay-as-you-go instance. For more information, see **Stop a preemptible 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. Stop instances as needed.

- To stop a single instance, find the instance and in the **Actions** column, choose **More > Instance Status > Stop**.
- To stop multiple instances, select the instances and click **Stop** in the lower-left corner of the instance list.
5. Complete required actions based on the instance network type and the **No Fees for Stopped Instances (VPC-Connected)** feature setting.

- If the network type is classic network or if **No Fees for Stopped Instances (VPC-Connected)** is not enabled:
  a. In the Stop Instance dialog box that appears, set **Stopped By**.
     - **Stop**: Stop the instance by shutting it down properly.
     - **Force Stop**: Forcibly stop the instance. Forcible stop is equivalent to a physical shutdown, and may cause data loss if instance data has not been written to disks.
  b. Click **OK**.

- If **No Fees for Stopped Instances (VPC-Connected)** is enabled:
  a. Move the pointer over the Information icon next to No Charges After Instance Is Stopped, and read the displayed message.
  b. Click **OK**.
  c. Set **Stopped By** and **Stop Mode**.
     - **Stop**: Stop the instance by shutting it down properly.
     - **Force Stop**: Forcibly stop the instance. Forcible stop is equivalent to a physical shutdown, and may cause data loss if instance data has not been written to disks.

**Note:**

If you set Stop Mode to No Charges After Instance Is Stopped, **No Fees for Stopped Instances (VPC-Connected)** will be displayed in the **Stop Mode** column on the Instances page after the instance is stopped. If you set Stop Mode to Retain Instance and Continue Charging After Instance Is Stopped, **Keep Instances and Continue Billing** will be displayed in the Stop Mode column.

d. Click **OK**.
For information about how to disable **No Fees for Stopped Instances (VPC-Connected)**, see #unique_152/unique_152_Connect_42_section_4h6_utd_2yr.

---

**Result**

The instance will be in the **Stopped** state after it is stopped.

**Related topics**

#unique_231

**8.3 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.

8.4 Release an instance

Only pay-as-you-go instances (including preemptible instances) and expired subscription instances can be released. This topic describes how to manually and automatically release a pay-as-you-go instance.

Prerequisites

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 more information, see Create a snapshot.

Context

- For a subscription instance, you can manually release the instance after it expires. If you do not renew the instance after it expires, the instance is automatically released.
- For a pay-as-you-go instance, if the No Fees for Stopped Instances (VPC-Connected) feature is not enabled, charges continue to incur until the instance is released.
- 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. For more information, see Enable and disable instance release protection.
- If the Release Disk with Instance feature is disabled for the disk attached to an instance, the disk is automatically converted to a pay-as-you-go data disk and retained when the instance is released. For more information, see #unique_234.

Manually release an instance

You can release a pay-as-you-go instance immediately in the 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. Configure the release.

- To release only one instance, find the instance that you want to release and choose More > Instance Status > Release in the Actions column.

- If you want to release multiple instances, find the pay-as-you-go instances based on the Billing Method, select the instances to be released, and click Release at the bottom of the list.

5. In the dialog box that appears, select Release Now.

6. Click Next, and then click OK.

Enable automatic release

You can enable the automatic release function and set a time to automatically release an instance. If you set the automatic release time multiple times, the latest setting works.

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. Configure the release.

   • To release only one instance, find the instance that you want to release and choose **More > Instance Status > Release** in the **Actions** column.
   
   • If you want to release multiple instances, find the pay-as-you-go instances based on the **Billing Method**, select the instances to be released, and click **Release** at the bottom of the list.

5. In the dialog box that appears, select **Scheduled Release**.

6. Turn on the automatic release switch, and specify the release date and time.

   **Note:**

   The automatic release time must be at least 30 minutes later than the current time.

7. Click **Next**, and then click **OK**.

**Disable automatic release**

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. Release configuration.
   - To disable the automatic release function for only one instance, find the instance that you want to release and choose More > Instance Status > Release in the Actions column.
   - If you want to disable the automatic release function for multiple instances, find the pay-as-you-go instances based on the Billing Method, select the instances for which you want to disable the automatic release function, and click Release at the bottom of the list.

5. In the dialog box that appears, select Scheduled Release.

6. Turn off the automatic release switch.

7. Click Next, and then click OK.

References

#unique_235
#unique_236

8.5 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.

8.6 View instance information

This topic describes how to view an overview of instances and details of a single instance under your account.

View instance resources on the Overview page

When you log on to the ECS console, the Overview page appears.

On the Overview page, you can view the following information of ECS instances under your account, including:

- **Pending Events**: lists all pending events and instances that are associated with the events.
- **My Resources**: lists ECS instances and other resources in each region.

View information of instances on the Instances page

Perform the following steps to go to the Instances page:

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. View the information of all ECS instances in the specified region, such as **Instance ID/ Name, Zone, IP Address, Status, Network Type, Billing Method, and Actions**. You can use **Column Filters** to customize your columns:

a) In the upper-right corner of the **Instances** page, click the icon.

b) In the **Column Filters** dialog box that appears, select the instance information that you want to view and click **OK**.

### Column Filters

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Tag</th>
<th>Monitoring</th>
<th>Zone</th>
<th>IP Address</th>
<th>Status</th>
<th>Network Type</th>
<th>Specifications</th>
<th>VPC Details</th>
<th>Instance Family</th>
<th>Billing Method</th>
<th>Automatic Renewal</th>
<th>SSH Key Pair</th>
<th>Connection Status</th>
<th>RAM Role</th>
<th>Dedicated Host</th>
<th>Deployment Set</th>
<th>Cluster ID</th>
</tr>
</thead>
</table>

**View information of a single instance on the Instance Details page**

You can perform the following steps to view the information of a single instance on the **Instance Details** page:

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 ECS instance that you want to view and click the instance ID or **Manage** in the corresponding **Actions** column.

**Note:**
The following table describes the information of an instance on the **Instance Details** page.
<table>
<thead>
<tr>
<th>Information</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Information</strong></td>
<td>The information that is related to instance identification, such as instance ID, name, zone, region, instance type, instance family, image ID, and key pair name (applicable only to Linux instances).</td>
</tr>
<tr>
<td><strong>Configuration Information</strong></td>
<td>The information that is related to instance configuration, such as vCPU, memory, instance type, operating system, IP address, bandwidth billing method, current bandwidth, and VPC (applicable only to VPC instances).</td>
</tr>
<tr>
<td><strong>Payment Information</strong></td>
<td>The information that is related to billing, such as billing method, stop mode, creation time, and automatic release time (applicable only to pay-as-you-go instances).</td>
</tr>
<tr>
<td><strong>Monitoring Information</strong></td>
<td>The information that is related to instance running, such as CPU and network usage.</td>
</tr>
</tbody>
</table>

You can switch from the **Instance Details** page to the **Disks, Snapshots**, or **Security Groups** page to view other types of resources of the instance.

**Related topics**

#unique_240

### 8.7 Modify the properties of an instance

After an instance is created, you can modify its name, hostname, and description. If the instance is a pay-as-you-go instance, you can also enable or disable release protection for the 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 target instance, and choose **More > Instance Settings > Modify Instance Properties** in the **Actions** column.
5. Modify the properties of the instance.
6. Click **OK**.
7. If the hostname of the instance is modified, restart the instance for the new hostname to take effect.

Notice:
You must restart an ECS instance by using the ECS console or by calling the RebootInstance operation. Restarting the instance from within the operating system will not work.

Related topics
#unique_139

8.8 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>
</tbody>
</table>
Elastic Compute Service

Instance / 8 Manage instances

<table>
<thead>
<tr>
<th>CPU option</th>
<th>API parameter</th>
<th>Function</th>
<th>Scenario</th>
<th>Applicable instance type</th>
</tr>
</thead>
</table>
| Number of threads per core | CpuOptions . ThreadsPerCore | Determines the total number of vCPUs. Number of vCPUs = Number of CPU cores × Number of threads per core. | 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 | For more information, see Numbers of CPU cores and threads per core. |

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_205 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-bp67acfmxazzb4ph*** --VSwitchId
```
To disable Hyper-Threading, set the **CpuOptions. ThreadsPerCore** parameter to 1 in the Alibaba Cloud CLI, shown in the following sample request:

```bash
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_240** 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:**

  ```bash
  aliyun ecs DescribeInstances --InstanceIds ['i-bp19rxmzeocge2z57***'] --output cols=CpuOptions rows=Instances.Instance[]
  ```

- **Sample response in the Alibaba Cloud CLI:**

  ```
  CpuOptions ---------
  map[CoreCount:1 ThreadsPerCore:2]
  ```

- **Sample codes by using the Shell command **lscpu**:**

  ```bash
  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 \( (\text{CpuOptions.Core}) \) and threads per core \( (\text{CpuOptions.ThreadsPerCore}) \). 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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</tr>
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<td>Instance type</td>
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<td>Valid values of threads per core</td>
</tr>
<tr>
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<td>ecs.hfg6.2xlarge</td>
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<tr>
<td>ecs.hfr6.xlarge</td>
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<tr>
<td>Instance type</td>
<td>Default value of vCPUs</td>
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<td>Default value of threads per core</td>
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</tr>
<tr>
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<td>1, 2</td>
</tr>
</tbody>
</table>

### 8.9 Modify instance maintenance attributes

By default, Alibaba Cloud automatically restarts an ECS instance if an automatic recovery event occurs for the instance, such as when the instance goes down unexpectedly or when an active O&M plan is carried out. You can customize the automatic recovery mode for an instance by modifying its maintenance attribute.

**Context**

For more information about automatic recovery and the applicable scope and impact of each maintenance attribute, see #unique_243.

**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 instance and use one of the following methods to modify the instance maintenance attribute.

- Method 1: In the *Actions* column corresponding to the instance, choose *More* > Operations and Troubleshooting > Modify Instance Maintenance Attribute.

- Method 2: Click the instance ID to go to the instance details page. In the *Basic Information* section, choose *More* > Modify Instance Maintenance Attribute.
5. In the **Modify Instance Maintenance Attribute** dialog box that appears, modify the instance maintenance attribute as needed. Click **OK**.

- If only cloud disks are attached to the instance, you can select one of the following options for Maintenance Action:
  - Automatically Restart
  - Stop
- If local disks are also attached to the instance, you can select one of the following options for Maintenance Action:
  - Automatically Restart
  - Stop
  - Automatically Redeploy

6. In the **Basic Information** section of the **Instance Details** page, confirm the setting that you made for **Maintenance Attribute**.

**Related topics**

#unique_244
#unique_245

### 8.10 Reset the logon password of an instance

This topic describes how to reset the logon password of an ECS instance. This topic is applicable to scenarios such as when you forget the password or when you did not set a password during instance creation.

**Prerequisites**

The instance is in a stable state, such as **Stopped** or **Running**. For more information about the status of an instance, see **ECS instance lifecycle**.

**Context**

- After you reset the logon password of an instance that is in the **Running** state, you must restart the instance to make the new password take effect. Restarting the instance may affect your services. We recommend that you reset the logon password during off-peak hours to avoid service disruption.
- If the instance is a Linux instance, you can log on to the instance by using the password or the key pair. If you only use the password for authentication, this authentication method becomes invalid after you attach a key pair to your instance. If you want to use both methods to log on to the instance, you must reset its logon password.
You can also change the logon password of an instance by connecting to the instance. The change takes effect immediately and you do not need to restart the instance. For more information, see Change the logon password of an instance by connecting to the 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. Based on the number of instances for which you want to change passwords, you can perform different operations.

- To reset the password of a single instance, find the target instance and choose More > Password/Key Pair > Reset Password in the Actions column.

- To reset the password of multiple instances, select the target instances and click Reset Password below the instance list.

5. In the Reset Password dialog box that appears, enter a valid new password and click Submit.
6. Based on the instance status, you can perform one of the following operations to make the new password take effect:

- If the instance is in the **Running** state, click **Restart Now**.
- If the instance is in the **Stopped** state, click **Cancel** and manually restart the instance.

If you click **Restart Now**, an error will be displayed, indicating that this operation is not supported while the instance is in the current state. However, the password is already reset and will take effect the next time the instance starts.

**Related topics**

#unique_139

### 8.11 Change the logon password of an instance by connecting to the instance

You can change the logon password of an instance without going to the console when you operate on the instance. The change takes effect immediately and you do not need to restart the instance. This topic describes how to change the logon password of an ECS Linux instance and an ECS Windows instance by connecting to the instance.

**Change the logon password of a Linux instance**

This topic takes a Linux instance that runs CentOS 7.6 as an example. Perform the following steps to 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 that you can use to connect to a Linux instance, see [Overview](#).
2. Run the `passwd username` command (for example, `passwd root`).
3. Enter a new password.
4. Enter the new password again to confirm the password.

**Change the logon password of a Windows instance**

This topic uses a Windows instance that runs Windows Server 2008 as an example. Perform the following steps to 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 that you can use to connect to a Windows instance, see [Overview](#).
2. Choose **Start** > **Run**, type `compmgmt.msc`, and press the Enter key.
3. In the **Computer Management** window, choose **System Tools** > **Local Users and Groups** > **Users**.
4. Right-click the username (for example, Administrator) for which you will change the password.

5. Click Set Password.

6. In the Set Password for Administrator dialog box, click Proceed. In the dialog box that appears, enter a new password in the New password and Confirm password fields, and then click OK.

Restart an instance
This topic describes how to restart an instance by using the ECS console.

#unique_247

## 8.12 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**.

**Note:**
To disable the instance release protection, clear **Enable Instance Release Protection.**

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.

![Warnings]

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.

8.13 Metadata

8.13.1 Metadata

The metadata of an ECS instance includes the instance ID, IP address, and the OS running on the instance. You can use metadata to manage and configure an instance.

Limits

Metadata is only applicable to VPC instances.

Note:

If you manually change instance information, your changes will not be indicated in the instance metadata.

Obtain the metadata of a Windows instance

1. Connect the instance remotely. For more information, see Overview.
2. Run the `Invoke-RestMethod http://100.100.100.200/latest/meta-data/` command on PowerShell to access the metadata information.
3. Add the specific metadata names to the preceding command to access the specified metadata. For more information, see Instance metadata and Dynamic instance metadata. For example:

- Run the Invoke-RestMethod http://100.100.100.200/latest/meta-data/instance-id command to obtain the ECS instance ID.
- Run the Invoke-RestMethod http://100.100.100.200/latest/meta-data/image-id command to obtain the image ID of the ECS instance.

**Obtain the metadata of a Linux instance**

1. Connect to the instance remotely. For more information, see Overview.
2. Run the curl http://100.100.100.200/latest/meta-data/ command to access the root directory of the metadata.
3. Add the specific metadata names to the preceding command to access the specified metadata. For more information, see Instance metadata and Dynamic instance metadata. For example:

- Run the curl http://100.100.100.200/latest/meta-data/instance-id command to obtain the ECS instance ID.
- Run the curl http://100.100.100.200/latest/meta-data/image-id command to obtain the image ID of the ECS instance.

**Instance metadata**

The following table lists all metadata that you can obtain from an ECS instance.

<table>
<thead>
<tr>
<th>Metadata</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dns-conf/nameservers</td>
<td>The DNS configurations of an instance</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/eipv4</td>
<td>The EIP address (IPv4 type) mounted to the primary ENI of an instance</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/hostname</td>
<td>The host name of an instance</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/instance/instance-type</td>
<td>The type of an instance</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/image-id</td>
<td>The ID of the image selected when an instance was created</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/image/market-place/product-code</td>
<td>The product code of an image in the Alibaba Cloud Marketplace</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/image/market-place/charge-type</td>
<td>The billing method of an image in the Alibaba Cloud Marketplace</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>Metadata</td>
<td>Description</td>
<td>Version</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>/instance-id</td>
<td>The ID of an instance</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/mac</td>
<td>The MAC address of an instance. If an instance has more than one ENIs, this metadata indicates only the MAC address of eth0.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network-type</td>
<td>The network type. Only VPCs are supported.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac</td>
<td>The MAC address list of ENIs</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/network-interface-id</td>
<td>The unique ID of the ENI. The [mac] parameter must be replaced with the actual MAC address.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/netmask</td>
<td>The subnet mask of the ENIs</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/vswitch-cidr-block</td>
<td>The IPv4 CIDR block of the VSwitch to which the ENIs belong</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/vpc-cidr-block</td>
<td>The IPv4 CIDR block of the VPC to which the ENIs belong</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/private-ipv4s</td>
<td>The private IPv4 addresses assigned by the ENIs</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/vpc-ipv6-cidr-blocks</td>
<td>The IPv6 CIDR block of the VPC to which the ENIs belong. Only VPC instances configured with IPv6 are supported.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/vswitch-id</td>
<td>The VSwitch ID of the security group to which the ENIs belong</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/vpc-id</td>
<td>The VPC ID of the security group to which the ENIs belong</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/primary-ip-address</td>
<td>The primary private IP address of the ENIs</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/mac/[mac]/gateway</td>
<td>The IPv4 gateway address of the ENIs</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/instance/max-netbw-egress</td>
<td>The maximum egress intranet bandwidth (in Kbit/s) of the instance type</td>
<td>2016-01-01</td>
</tr>
<tr>
<td><strong>Metadata</strong></td>
<td><strong>Description</strong></td>
<td><strong>Version</strong></td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>/instance/max-netbw-ingress</td>
<td>The maximum ingress intranet bandwidth (in Kbit/s) of the instance type</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/macs/[mac]/ipv6s</td>
<td>The IPv6 addresses assigned by the ENIs. Only VPC instances configured with IPv6 are supported.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/macs/[mac]/ipv6-gateway</td>
<td>The IPv6 gateway address of the VPC to which the ENIs belong</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/network/interfaces/macs/[mac]/vswitch-ipv6-cidr-block</td>
<td>The IPv6 CIDR block of the VSwitch to which the ENIs belong. Only VPC instances configured with IPv6 are supported.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/private-ipv4</td>
<td>The private IPv4 address of the primary ENI of an instance</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/public-ipv4</td>
<td>The Internet IPv4 address of the primary ENI of an instance</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/ntp-conf/ntp-servers</td>
<td>The address of an NTP server</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/owner-account-id</td>
<td>The Alibaba Cloud account ID of the instance owner</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 to which an instance belongs</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/zone-id</td>
<td>The ID of the zone to which an instance belongs</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 image library from which the package management software of a Linux instance obtains updates. The source is usually a YUM or APT source.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/kms-server</td>
<td>The server that activates the KMS of a Windows instance</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/wsus-server/wu-server</td>
<td>The server that updates 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 Windows instance</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/vpc-id</td>
<td>The ID of the VPC to which an instance belongs</td>
<td>2016-01-01</td>
</tr>
</tbody>
</table>
### Dynamic instance metadata

You can obtain the dynamic metadata of an instance. Dynamic instance metadata refers to data generated after an instance is started for the first time. The following dynamic metadata is supported:

<table>
<thead>
<tr>
<th>Metadata</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>/vpc-cidr-block</td>
<td>The CIDR block of the VPC to which an instance belongs</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/vsswitch-cidr-block</td>
<td>The CIDR block of the VSwitch to which an instance belongs</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/vswitch-id</td>
<td>The ID of the VSwitch to which an instance belongs</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/ram/security-credentials /[role-name]</td>
<td>The temporary STS credential generated according to the policy of a RAM role. This credential is available only after you attach a RAM role to an ECS instance. The <code>[role-name]</code> parameter must be replaced with the actual RAM role name.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/instance/spot/termination-time</td>
<td>The stop and release time set in the OS of a preemptible instance. The time is specified in UTC+0 format (yyyy-MM-ddThh:mm:ssZ), for example, 2018-04-07T17:03:00Z.</td>
<td>2016-01-01</td>
</tr>
<tr>
<td>/instance/virtualization-solution</td>
<td>The ECS virtualization solution, which can be ECS Virt 1.0 or Virt 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-identity/pkcs7</td>
<td>The instance identity signature</td>
<td>2016-01-01</td>
</tr>
</tbody>
</table>

**Note:**
A new STS credential is available 30 minutes prior to the expiry of the old one. During this period, both STS credentials can be used.
- **O&M metadata**: You can obtain the dynamic metadata relating to active *System events*.
  
  - For Windows instances, run the following command:
    
    ```bash
    Invoke-RestMethod http://100.100.100.200/latest/maintenance/active-system-events
    ```
  
  - For Linux instances, run the following command:
    
    ```bash
    curl http://100.100.100.200/latest/maintenance/active-system-events
    ```

- **Identity metadata**: You can obtain the dynamic metadata relating to *Instance identity*.
  
  - For Windows instances, run the following command:
    
    ```bash
    Invoke-RestMethod http://100.100.100.200/latest/dynamic/instance-identity/document
    ```
  
  - For Linux instances, run the following command:
    
    ```bash
    curl http://100.100.100.200/latest/dynamic/instance-identity/document
    ```

- **Configuration metadata**: You can obtain the dynamic metadata relating to *User data*.
  
  - For Windows instances, run the following command:
    
    ```bash
    Invoke-RestMethod http://100.100.100.200/latest/user-data
    ```
  
  - For Linux instances, run the following command:
    
    ```bash
    curl http://100.100.100.200/latest/user-data
    ```

### 8.13.2 Access mode of instance metadata

The metadata of ECS instances can be accessed in normal or security-enhanced mode. In security-enhanced mode, ECS instances access instance metadata by using token-based authentication. The security-enhanced mode provides better protection against Server-Side Request Forgery (SSRF) attacks than the normal mode does.

**Overview**

An SSRF is an attack in which an attacker takes advantage of vulnerabilities in a server to send crafted resource requests to the server and access resources located within the same internal network. When a request for instance metadata is received, the instance metadata server shares the requested metadata in the format of URLs. These URLs are vulnerable to tampering and may be used to attack internal systems that are not accessible to external networks. To prevent SSRF attacks, we recommend that you access instance metadata in security-enhanced mode.
The following table compares the normal and security-enhanced modes.

<table>
<thead>
<tr>
<th>Comparison item</th>
<th>Normal mode</th>
<th>Security-enhanced mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interaction mode</td>
<td>Requests and responses.</td>
<td>Sessions.</td>
</tr>
<tr>
<td>Security verification</td>
<td>Verification of source IP addresses in the same VPC.</td>
<td>Token-based authentication.</td>
</tr>
<tr>
<td>Access method</td>
<td>Use cURL commands to access the endpoint.</td>
<td>Use cURL commands to access the endpoint. Requests must include token headers.</td>
</tr>
</tbody>
</table>

In normal mode, a new connection is established with each request to access instance metadata, and the connection is released immediately after the request has been completed. This mode uses a simple verification method. If the instance metadata server is attacked and sensitive data such as RAM roles is leaked, your data and assets are under threats.

In security-enhanced mode, you can establish a session between an ECS instance and the instance metadata server. When you access instance metadata through the ECS instance, the instance metadata server authenticates your identity based on a token. When the token expires, the instance metadata server closes the session and deletes the token. For more information about the access process, see Procedure to access instance metadata in security-enhanced mode. The following limits apply to tokens:

- Each token can only be used for a single ECS instance. If you copy the token file of one ECS instance to another ECS instance, the instance metadata server will deny access from the ECS instance using the copied token file.
- Each token must have a defined validity period ranging from 1 to 21,600 seconds (six hours). Tokens can be repeatedly used until they expire. This helps achieve a good balance between security and user experience.
- Proxy access is not supported. If a token creation request contains the X-Forwarded-For header, the instance metadata server will refuse to issue the token.
- An unlimited number of tokens can be issued to each ECS instance.

**Scenarios of the security-enhanced mode**

In the following scenarios, we recommend that you access instance metadata in security-enhanced mode to prevent SSRF attacks and improve the security of applications:

- Access self-built network firewall applications.
• Access self-built reverse proxy applications.
• Access self-built web applications that provide transcoding and download services.

Procedure to access instance metadata in security-enhanced mode

This section describes how to run a cURL command to create and use a token to access instance metadata in security-enhanced mode.

1. Use the PUT method to initiate a request to create a token.

   You must specify the token validity period in the header in the following format: X-aliyun-ecs-metadata-token-ttl-seconds:<token validity period>.

2. The instance metadata server issues the token.

3. When you access instance metadata, enter the endpoint of the instance metadata server and the token header.

   Token header format: x-aliyun-ecs-metadata-token: $TOKEN.

4. When authentication succeeds, the instance metadata server returns the requested instance metadata.

The following command is a sample command to create and use a token:

```
TOKEN=`curl -X PUT "http://100.100.100.200/latest/api/token" -H "X-aliyun-ecs-metadata-token-ttl-seconds: 21600"` 
&& curl -H "X-aliyun-ecs-metadata-token: $TOKEN" http://100.100.100.200/latest/metadata/instance-id
```

The preceding sample command involves the following steps:

• Use the PUT method to create a token with a validity period of 21,600 seconds (6 hours).
• Use the TOKEN variable to store the token.
• Access the instance ID in instance metadata and include the $TOKEN variable in the request.

Tokens can be repeatedly used until they expire. The following command is a sample command to use an existing token:

```
curl -H "X-aliyun-ecs-metadata-token: $TOKEN" http://100.100.100.200/latest/metadata/instance-id
```

Error examples:
8.13.3 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
```

8.14 User data

8.14.1 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_160) 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>
<tbody>
<tr>
<td>Windows Server 2008 R2 and later version</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>

**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:**

- **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>
<tbody>
<tr>
<td>Windows Server 2008 R2 and later version</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>

**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.

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- 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:**
The first line must meet the format requirements of the instance user data script, such as `#!/bin/sh`, `#cloud-config`, `#upstart-job`, [bat] 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:**
   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:

In the preceding figure, the startup job file part-001.conf is generated in the /etc/init folder.

Related API: #unique_160

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_259

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**.

![Set User Data](image)

**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_249](#)

**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:

```
#!/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:

```
#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.

```
[localhost localhost.localdomain localhost4 localhost4.localdomain4 :1
localhost localhost.localdomain localhost6 localhost6.localdomain6
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.

8.14.2 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.
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.

8.14.3 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 -a /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
```
```bash
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.
8.14.4 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 AAAAB3NzaC1yc2EAAAABJQAAAQEAHqEhEh/rGbIMCGItFVtYpsXPQrC
aunG/JKvXWlN1rGZwusLC290qOZ93KCebo6X1Iby1Wm+psY8iHE+/BxsQ0M0H2f
kQZD2vXuhRb4Xi1zg89jHskX+0jnbjqiYGY+Brgai9BvKDXTTSjYtCYUnEXkvcK+D1ZwxbNuk2
QZ0ryHESDbSaczlNFgEQEDxhCrvko+zWLjTVnomVUDhdMP2g6fZ0tgFVwkjF
```

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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.

8.15 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>
<tr>
<td>zone-id</td>
<td>ID of the zone to which the instance belongs</td>
<td>No</td>
</tr>
<tr>
<td>Properties</td>
<td>Description</td>
<td>Can it be changed?</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------</td>
<td>----------------------------------------------------------</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 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.

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 certification of Alibaba Cloud in all regions is as follows.

```
-----BEGIN CERTIFICATE-----
MIIDzCAIgAwIBAgIQABgkqhkiG9w0BAQQFADhsMRswwIgYDVQQDDBBkcm93cDQx
MB4XDTE4MDIyMzAxMjkzOFoXDTM4MDIxODIxMjkzOFowcDQxMIIBIjANBgkqhkiG9w
-----END CERTIFICATE-----
```
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.
   
   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.

```bash
#!/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 "-----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.

```bash
#!/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 "-----END CERTIFICATE-----" >> 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.

### 8.16 Manage software on Linux instances

#### 8.16.1 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 Connection methods.

2. Run the following command to back up the original software repository.

   ```
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.

   ```
   
   ```

   **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.

   ![ yum repolist output](image)

   **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 Connection methods.
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_267.

```
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
```

**Note:**

- To view the steps of adding software repositories of Alibaba Cloud on other versions of Ubuntu, visit the Alibaba Open Source Mirror Site, find ubuntu, 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.

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 Connection methods.
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_267`.

```bash
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 ECS instance, replace `http://mirrors.aliyun.com/debian/` 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.

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
repo
```

```bash
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 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.

```
```

```
```

**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.

### 8.16.2 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.

    ![Yum search 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.

    ![Yum search result](image)
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_270.
Search for software packages on Debian or Ubuntu

- **Command**
  
  ```
  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.
    ```
    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".
    ```
    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.

8.16.3 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 Connection methods.
2. Run the following command to install software packages.

```
yum install <package>  # Replace <package> with the software package you want to install.
```

For example, to install Apache HTTP Server, run the following command.

```
yum install httpd
```

### Install software packages on Debian or Ubuntu

1. Connect to a Linux instance. For more information, see [Connection methods](#).
2. Run the following command to install software packages.

```
# 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.

```
# apt-get update
# apt-get install apache2
```

### Install software packages on openSUSE

1. Connect to a Linux instance. For more information, see [Connection methods](#).
2. Run the following command to install software packages.

```
zypper install <package>  # Replace <package> with the software package you want to install.
```

For example, to install Apache HTTP Server, run the following command.

```
zypper install apache2
```

### 8.16.4 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 Connection methods.
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.

     ```bash
     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 Connection methods.
2. Run the following command to obtain a list of software packages that need to be updated.

```
apt-get update
```

3. Update software applications.

- To update a software application, run the following command.

```
apt-get install <package> # Replace <package> with the software application you want to update.
```

For example, to update Python, run the following command:

```
apt-get install python
```

- 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.

```
apt-get upgrade
```

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 [Connection methods](#).
2. Run the following command to obtain a list of software packages that need to be updated.

```
zypper list-updates
```

3. Update software applications.

- To update a software application, run the following command.

```
zypper update <package>  # Replace <package> with the software application you want to update.
```

For example, to update Python, run the following command.

```
zypper update python
```

- To update all software applications in the system, run the following command.

```
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.

```
zypper update
```

After updating a software application, you can check its version. If it is the latest version, the software application has been updated.

### 8.17 Configure time

#### 8.17.1 Alibaba Cloud NTP server

This topic describes Alibaba Cloud Network Time Protocol (NTP) servers. Alibaba Cloud provides internal and public NTP servers to synchronize the local time of ECS instances in each network.

**Internal and public NTP servers**

NTP is used to synchronize the computer time in a network.

The consistency of time and time zone is important to ECS instances because it can affect the task execution results. For example, when you update a database or analyze logs, the time sequence has a significant impact on the results. When you run business on ECS
instances, you must standardize the time zone of the involved instances to avoid problems such as logical confusion and network request errors. In addition, you can use NTP servers to synchronize the local time of all ECS instances in a network.

ECS provides a high-precision NTP server for your convenience. The ntp.cloud.aliyuncs.com server offers a globally distributed NTP service that uses Stratum 1 servers. Stratum 1 servers are suitable for industries that require precise timing, such as finance, communication, scientific research, and astronomy. The NTP service is also used to synchronize the local time between ECS instances and other cloud services. The following table describes the domain names of Alibaba Cloud NTP servers in various networks.

<table>
<thead>
<tr>
<th>Classic network (internal network)</th>
<th>VPC (internal network)</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>ntp.cloud.aliyuncs.com</td>
<td>ntp.aliyun.com</td>
</tr>
<tr>
<td>ntp1.cloud.aliyuncs.com</td>
<td>ntp7.cloud.aliyuncs.com</td>
<td>ntp1.aliyun.com</td>
</tr>
<tr>
<td>ntp2.cloud.aliyuncs.com</td>
<td>ntp8.cloud.aliyuncs.com</td>
<td>ntp2.aliyun.com</td>
</tr>
<tr>
<td>ntp3.cloud.aliyuncs.com</td>
<td>ntp9.cloud.aliyuncs.com</td>
<td>ntp3.aliyun.com</td>
</tr>
<tr>
<td>ntp4.cloud.aliyuncs.com</td>
<td>ntp10.cloud.aliyuncs.com</td>
<td>ntp4.aliyun.com</td>
</tr>
<tr>
<td>ntp5.cloud.aliyuncs.com</td>
<td>ntp11.cloud.aliyuncs.com</td>
<td>ntp5.aliyun.com</td>
</tr>
<tr>
<td>ntp6.cloud.aliyuncs.com</td>
<td>ntp12.cloud.aliyuncs.com</td>
<td>ntp6.aliyun.com</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>ntp7.aliyun.com</td>
</tr>
</tbody>
</table>

Other Alibaba Cloud public services

The following table describes other public services provided by Alibaba Cloud.

<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>Public images: <a href="https://developer.aliyun.com/mirror">https://developer.aliyun.com/mirror</a></td>
<td>Update frequency: The image files are updated every day from 02:00 to 04:00 (UTC +8). The images contain a wide collection of Linux distributions and open source software.</td>
</tr>
</tbody>
</table>

References

- Configure the NTP service for Windows instances
- Time setting: Synchronize NTP servers and change time zone for Linux instances
8.17.2 Configure the NTP service for Windows instances

This topic describes how to enable and configure the NTP service for a Windows instance to ensure the local system time is synchronized precisely.

Context

ECS instances in all Alibaba Cloud regions use UTC+8 by default. You can also configure or modify time zones for your instances as needed.

This topic uses Windows Server 2012 R2 Datacenter Edition 64-bit as an example to describe how to use the NTP service to synchronize the local system time for Windows instances.

Enable the NTP service

By default, the Windows Time service is enabled on Windows Server operating systems. Therefore, the NTP service must be enabled for Windows instances to synchronize the local system time. To check and enable the NTP service, perform the following operations:

1. Connect to a Windows instance.
2. Click Start and open the Run dialog box. Run the services.msc command in the dialog box.
3. In the Services dialog box that appears, find and double-click Windows Time.
4. In the Windows Time Properties (Local Computer) dialog box that appears, perform the following operations:
   a) Select Automatic for Startup type.
   b) Ensure that the value of Service status is Running. Otherwise, click Start.
   c) Click Apply and click OK.

Modify the default NTP server address

By default, Windows Server operating systems use the Microsoft NTP server (time.windows.com), but synchronization errors may occur. When you use a Windows instance, you can replace the default NTP server with the intranet NTP server provided by Alibaba Cloud. To modify the default NTP server address, perform the following operations:

1. Connect to a Windows instance.
2. In the notification area of the taskbar, click the date and time and click Change date and time settings.
3. In the **Date and Time** dialog box that appears, click the **Internet Time** tab and click **Change settings**.

4. In the **Internet Time Settings** dialog box that appears, select **Synchronize with an Internet time server** and enter an Alibaba Cloud intranet NTP server address. Click **Update now**. For more information, see **Alibaba Cloud NTP server**.

**Modify the NTP synchronization interval**

The default NTP synchronization interval is five minutes, you can modify it as needed. To modify the NTP synchronization interval, perform the following operations:

1. **Connect to a Windows instance**.

2. Click **Start** and open the **Run** dialog box. Run the `regedit` command in the dialog box.

3. In the left-side navigation pane of the **Registry Editor**, choose `HKEY_LOCAL_MACHINE > SYSTEM > CurrentControlSet > Services > W32Time > TimeProviders > NtpClient` and double-click **SpecialPollInterval**.

4. In the **Edit DWORD (32-bit) Value** dialog box that appears, select **Decimal** in the **Base** section and enter the required value in the **Value data** field. The required value is the new synchronization interval. Unit: seconds.

5. Click **OK**.

**Related concepts**

**Alibaba Cloud NTP server**

This topic describes Alibaba Cloud Network Time Protocol (NTP) servers. Alibaba Cloud provides internal and public NTP servers to synchronize the local time of ECS instances in each network.

**Related tasks**

**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.

**8.17.3 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 ntpdate and the ntpd two approaches of synchronizing the NTP service. The ntpdate 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 `ntpstat` 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 `ntpstat` 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 automatically released.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

**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>
<tbody>
<tr>
<td>Not enabled</td>
<td>Within 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>15 days after expiration</td>
<td>The instance and its resources are being released or unbound.</td>
<td>Manual renewal cannot be performed.</td>
</tr>
<tr>
<td></td>
<td>30 days after expiration</td>
<td>The instance and its resources have been released or unbound.</td>
<td>Manual renewal cannot be performed.</td>
</tr>
<tr>
<td>Whether auto renewal is enabled</td>
<td>Time period after expiration</td>
<td>Instance status</td>
<td>Effect of manual renewal</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------</td>
<td>-----------------</td>
<td>--------------------------</td>
</tr>
</tbody>
</table>
| Enabled                        | Within 15 days after expiration | The instance is working properly. | 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. |
|                               | 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. |
|                               | 30 days after expiration       | The instance and its resources are being released or unbound. | Manual renewal cannot be performed. |

**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 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_247 operation within the first seven days of the new billing cycle to make the new configurations take 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_279
  - #unique_280

### 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_281

9.3 Enable auto-renewal

Compared with manual renewal, auto-renewal can help you save management costs and prevents the services of ECS instances from being interrupted if you fail to renew instances. This topic describes how to enable the auto-renewal feature.

Context

After auto-renewal is enabled for an ECS instance, the instance is automatically renewed before it expires.

For more information about the fund deduction process of auto-renewal, see Renewal overview.

Enable auto-renewal on the Create Instance page

You can enable auto-renewal on the Create Instance page, as shown in the following figure. For more information about how to create an ECS instance, see Create an instance by using the provided wizard.
Enable auto-renewal on the Instances page

On the Instances page, you can enable auto-renewal for one or more ECS instances or change the renewal period.

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 a method to enable auto-renewal.
   - Enable auto-renewal for one ECS instance: Find the instance and choose **More > Instance Settings > Configure Auto Renewal** in the **Actions** column.
   - Enable auto-renewal for one or more ECS instances: Select the instances. At the bottom of the instances list, choose **More > Instance Settings > Configure Auto Renewal**.
5. Turn on the **Auto Renewal** switch, select the renewal period, and then click **OK**.

Enable auto-renewal on the Renew page

On the Renew page, you can enable auto-renewal for one or more ECS instances or change the renewal period.

1. Log on to the **ECS console**.
2. In the top navigation bar, choose **Billing > Renew**.
3. In the left-side navigation pane, click **Elastic Compute Service**.
4. Click the **Manually Renew** tab.
5. Select a method to enable auto-renewal.
   - Enable auto-renewal for one ECS instance: Find the instance and click **Enable Auto-Renew** in the **Actions** column.
   - Enable auto-renewal for one or more ECS instances: Select the instances. At the bottom of the instances list, click **Enable Auto-Renew**.
6. Select the auto-renewal period and click **Enable Auto-Renew**.
   
   Click the **Auto-Renew** tab. The previously selected instances are displayed in the list, 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_247 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_279
  - #unique_280

**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 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 (the number of vCPUs and memory size), billing method for data disks, and Internet bandwidth.

Upgrade or downgrade an instance

Upgrading or downgrading an instance will change the number of vCPUs and memory size at the same time. The number of vCPUs and memory size must be changed together, and neither of them can be changed separately. For more information about instance types, see Instance families. Before changing instance specifications, check Instance families that support instance type changes and confirm the target instance type supported by a specific instance family.

The following table summarizes the change methods best suited for the billing method applied to your instance.
<table>
<thead>
<tr>
<th>Billing method</th>
<th>Upgrade method</th>
<th>Downgrade method</th>
</tr>
</thead>
</table>
| Subscription        | Upgrade configurations of subscription instances  | • 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 an instance 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. |
|                     | The new specifications take effect after you restart the instance in the ECS console or by calling the RebootInstance operation. |                  |
| Pay-as-you-go        | Change configurations of Pay-As-You-Go instances   | Change configurations of Pay-As-You-Go instances  
The new specifications take effect after you start the instance. |
|                     | The new specifications take effect after you start 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.

<table>
<thead>
<tr>
<th>Billing method change</th>
<th>Operation</th>
<th>Effective time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pay-as-you-go to subscription</td>
<td>Upgrade configurations of subscription instances</td>
<td>Immediately</td>
</tr>
<tr>
<td>Subscription to pay-as-you-go</td>
<td>#unique_286</td>
<td>Immediately</td>
</tr>
<tr>
<td></td>
<td>Downgrade an instance during renewal</td>
<td>From the new billing cycle</td>
</tr>
</tbody>
</table>
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>Conversion of the billing method</th>
<th>Method</th>
<th>Effective time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subscription</td>
<td>From pay-by-traffic to pay-by-bandwidth</td>
<td>Upgrade configurations of subscription instances</td>
<td>Immediately</td>
</tr>
<tr>
<td></td>
<td>From pay-by-bandwidth to pay-by-traffic</td>
<td>Downgrade the public bandwidth of subscription instances</td>
<td>Immediately</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Downgrade an instance during renewal</td>
<td>From the next billing cycle</td>
</tr>
<tr>
<td>Pay-as-you-go</td>
<td>From pay-by-traffic to pay-by-bandwidth</td>
<td>Change the Internet bandwidth of a pay-as-you-go instance</td>
<td>Immediately</td>
</tr>
<tr>
<td></td>
<td>From pay-by-bandwidth to pay-by-traffic</td>
<td>Change the Internet bandwidth of a pay-as-you-go instance</td>
<td>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 the public IP address of the instance:

- For a VPC-type ECS instance, its public IP address is released immediately.
- A classic network-type instance cannot access the Internet but its 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 public IP address to your instance. If you choose not to assign
Internet bandwidth (that is, keep the Internet bandwidth at 0 Mbit/s) when creating an instance, you can assign a 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 an instance 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 change 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

This topic describes the instance families that support instance type changes. If your instance type does not meet the current needs of your business, check whether you can change the instance type. Then select a method to change the instance type.

**Impact of instance type changes**

The impact of instance type changes varies with the network type of instances:

- **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 names, and software authorization codes will be changed. For Linux instances, device names of basic disks (cloud) will be changed to the form of xvda or xvdb, while device names of ultra disks (cloud_efficiency) and standard SSDs (cloud_ssd) will be changed to the form of vda or vdb.
  
  - If the instance belongs to an available instance family, the private IP address of the instance will be 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 codes and the device names of the disks will be changed. For Linux instances, device names of basic disks (cloud) will be changed to the form of xvda or xvdb, while device names of ultra disks (cloud_efficiency) and standard SSDs (cloud_ssd) will be changed to the form of vda or vdb.
Instance families not supporting instance type changes

The following instance families do not support instance type changes between instance families or within an instance family:

- Big data instance families: d2s, d1, and d1ne
- Instance families with local SSDs: i1, i2, and i2g
- Compute optimized instance families with GPU capabilities: vgn5i, gn5, and gn6i
- Graph acceleration instance family with GPU capabilities: ga1
- FPGA-based compute-optimized instance families: f1 and f3
- ECS Bare Metal Instances: ebmgn6e, ebmgn6v, ebmgn6i, ebmc6, ebmg6, ebmr6, ebmhfc6, ebmhfg6, ebmhfr6, ebmc5s, ebmg5s, ebmr5s, ebmhfg5, ebmc4, and ebmg5
- Super Computing Clusters (SCCs): sccg5, scch5, and sccgn6

Instance families supporting instance type changes

The following tables list instance families that support instance type changes. The destination instance families apply to both subscription and pay-as-you-go instances.

Note:
Some instance types may not be available in all zones. Before you change the instance type of an instance, check whether the destination instance type or instance family is available in the current zone.

Table 10-1: Shared 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, sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>s6</td>
<td>s6</td>
</tr>
<tr>
<td>n4, mn4, xn4, and e4</td>
<td>n4, mn4, xn4, and e4, sn1, sn2, se1, n1, n2, e3, sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, and t5</td>
</tr>
<tr>
<td>Source instance family</td>
<td>Destination instance family (type)</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>g6, c6, and r6</td>
<td>• g6, c6, and r6</td>
</tr>
<tr>
<td></td>
<td>• hfc6, hfg6, and hfr6</td>
</tr>
<tr>
<td>g5, r5, c5, and ic5</td>
<td>• g5, r5, c5, and ic5</td>
</tr>
<tr>
<td></td>
<td>• 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</td>
</tr>
<tr>
<td></td>
<td>• c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>se1</td>
<td>• se1</td>
</tr>
<tr>
<td></td>
<td>• 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</td>
</tr>
<tr>
<td></td>
<td>• sn1ne, sn2ne, se1ne, c4, cm4, ce4, hfc5, hfg5, g5, r5, c5, ic5, re4, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>hfc6, hfg6, and hfr6</td>
<td>• hfc6, hfg6, and hfr6</td>
</tr>
<tr>
<td></td>
<td>• g6, c6, and r6</td>
</tr>
<tr>
<td>hfc5 and hfg5</td>
<td>• hfc5 and hfg5</td>
</tr>
<tr>
<td></td>
<td>• 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>gn6e</td>
<td>gn6e</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</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, t5, n4, mn4, xn4, and e4</td>
</tr>
<tr>
<td>n1, n2, and e3</td>
<td>• n1, n2, and e3</td>
</tr>
<tr>
<td></td>
<td>• sn1, sn2, se1, sn1ne, sn2ne, se1ne, c4, cm4, ce4, 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.

<table>
<thead>
<tr>
<th>Source instance family</th>
<th>Destination instance family (type)</th>
</tr>
</thead>
<tbody>
<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>
- 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_247
#unique_289
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_247 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_279
  - #unique_280

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 public bandwidth of subscription instances

You can downgrade the public bandwidth of subscription instances.

Prerequisites

An instance can be downgraded only when it 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 real-time downgrade may result in a refund. The refund amount is calculated based on the following formula: Refund amount = Remaining amount of the configuration fee before the downgrade - Price of the new configurations.

You can use the real-time bandwidth downgrade feature to perform the following operations:

• If the current bandwidth billing method is **Pay-By-Bandwidth**, you can perform the following operations:
  - 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. However, you cannot change the billing method to **Pay-By-Bandwidth**.

**Note:**

If you lower the bandwidth of a VPC-type instance 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 on a real-time basis for a maximum of three times. Real-time downgrade operations include instance specifications downgrades, bandwidth configurations downgrades, and the change of the disk billing method from subscription to pay-as-you-go.
• The interval between two real-time downgrade operations must be at least five minutes.
• If a VPC-type instance has an EIP associated, its bandwidth configurations cannot be
downgraded.

For more information about how to upgrade the bandwidth of a subscription instance, see
Upgrade configurations of subscription instances.

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 Upgrade/Downgrade in the Actions column.
4. In Upgrade/Downgrade Wizard dialog box that appears, click Downgrade, select
Bandwidth Configuration, and then click Continue.
5. Set the bandwidth, and then read and select ECS Service Terms .
6. Click Downgrade Now.

Note:
The downgrade takes effect immediately. You do not need to restart your instance.

Related topics
#unique_289
#unique_292

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, 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>
<tr>
<td></td>
<td>Allocated public IP address</td>
<td>Change the bandwidth of the pay-as-you-go instance</td>
</tr>
<tr>
<td>Network type</td>
<td>Public IP category</td>
<td>Available feature</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>Classic network</td>
<td>Allocated public IP address</td>
<td>Change the bandwidth of the pay-as-you-go instance</td>
</tr>
</tbody>
</table>

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_289
#unique_296

10.6 Modify the bandwidth of an Elastic IP address

ECS instances in VPCs are associated with Elastic IP addresses to have access to the Internet. You can modify the peak bandwidths of the Elastic IP addresses that are associated to subscription or pay-as-you-go ECS instances.

Prerequisites
The ECS instance is associated with an Elastic IP address.

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 ECS instance and click Upgrade/Downgrade in the Actions column.
5. In the Upgrade/Downgrade Wizard dialog box, select Bandwidth Adjustment and click Continue.
6. Select a new peak bandwidth.
   For more information, see Modify the peak bandwidth of an EIP.
7. Select Elastic IP Agreement of Service and click Activate.
Result

The changes take effect immediately without the need to restart the instance.
11 Phased-out instance types

This topic describes all phased-out instance types on the China site (aliyun.com). However, instance types sn1, sn2, n1, n2, and e3 are still available for purchase on the International site (alibabacloud.com).

Instructions for specifications

- The packet forwarding rate refers to the total number of inbound and outbound packets that can be processed by a network per second. 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, a 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). Shared instance types that are equipped with four or more vCPUs support ENIs. For more information, see #unique_83.

Instance type upgrade

For information about the phased-out instance types that can be upgraded to new instance types, see Instance families supporting instance type changes.

sn2, general purpose instance family

Features

- Offers a CPU-to-memory ratio of 1:4.
- Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) or E5-2680 v3 (Haswell) processors with consistent computing performance.
- Provides a fast and reliable network based on large 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>None</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>None</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>None</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>None</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>None</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>
<td>None</td>
<td>10.0</td>
<td>1,200</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

**sn1, compute optimized instance family**

Features

- Offers a CPU-to-memory ratio of 1:2.
- Equipped with 2.5 GHz Intel Xeon E5-2682 v4 (Broadwell) or E5-2680 v3 (Haswell) processors with consistent computing performance.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Web frontend servers
  - Frontend servers of massively multiplayer online (MMO) games
  - Data analysis, batch processing, and video encoding
  - High-performance scientific and engineering applications

Instance types
## Elastic Compute Service

### Instance type / 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.sn1. medium</td>
<td>2</td>
<td>4.0</td>
<td>None</td>
<td>0.5</td>
<td>100</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>ecs.sn1. large</td>
<td>4</td>
<td>8.0</td>
<td>None</td>
<td>0.8</td>
<td>200</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>ecs.sn1. xlarge</td>
<td>8</td>
<td>16.0</td>
<td>None</td>
<td>1.5</td>
<td>400</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ecs.sn1. 3xlarge</td>
<td>16</td>
<td>32.0</td>
<td>None</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>None</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.
- Supports standard SSDs and ultra disks.
- Provides consistent computing performance.
- Equipped with 3.2 GHz Intel Xeon E5-2667 v4 (Broadwell) processors.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - High-performance web frontend servers
  - High-performance scientific and engineering applications
  - MMO gaming and video encoding

**c4**
<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.c4. xlarge</td>
<td>4</td>
<td>8.0</td>
<td>None</td>
<td>1.5</td>
<td>200</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>ecs.c4. 2xlarge</td>
<td>8</td>
<td>16.0</td>
<td>None</td>
<td>3.0</td>
<td>400</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ecs.c4. 3xlarge</td>
<td>12</td>
<td>24.0</td>
<td>None</td>
<td>4.5</td>
<td>600</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>ecs.c4. 4xlarge</td>
<td>16</td>
<td>32.0</td>
<td>None</td>
<td>6.0</td>
<td>800</td>
<td>2</td>
<td>8</td>
</tr>
</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>ecs.ce4. xlarge</td>
<td>4</td>
<td>32.0</td>
<td>None</td>
<td>1.5</td>
<td>200</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>ecs.ce4. 2xlarge</td>
<td>8</td>
<td>64.0</td>
<td>None</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>ecs.cm4. xlarge</td>
<td>4</td>
<td>16.0</td>
<td>None</td>
<td>1.5</td>
<td>200</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>ecs.cm4. 2xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<td>3.0</td>
<td>400</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
### Instance Type Details

<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>None</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>None</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>None</td>
<td>10.0</td>
<td>1,200</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

**ga1**, visualization and compute optimized instance family with GPU capabilities

**Features**

- I/O optimized.
- Supports standard SSDs and ultra disks.
- Uses AMD S7150 GPUs.
- Offers a CPU-to-memory ratio of 1:2.5.
- Equipped with 2.5 GHz Intel® Xeon® E5-2682 v4 (Broadwell) processors.
- Equipped with high-performance local NVMe SSDs.
- Provides a fast and reliable network based on large computing capacity.
- Suitable for the following scenarios:
  - Rendering and multimedia encoding and decoding
  - Machine learning, high performance computing, and high-performance databases
  - Server-side workloads that require powerful concurrent floating-point compute capabilities

**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 (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. 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>ecs. ga1. 4xlarge</td>
<td>16</td>
<td>40.0</td>
<td>1 × 350</td>
<td>1</td>
<td>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</td>
<td>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</td>
<td>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.
- 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 specifications.

**n1, n2, and e3, shared instance families**

**Features**
- Equipped with 2.5 GHz Intel Xeon E5-2680 v3 (Haswell) processors.
- Provides a fast and reliable network based on large computing capacity.
- I/O optimized.
- Supports 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>
</table>
| n1              | Shared compute optimized instances | 1:2                 | • Small and medium-sized web servers
• Batch processing
• Distributed analysis
• Advertisement services |
| n2              | Shared general purpose instances | 1:4                 | • Medium-sized web servers
• Batch processing
• Distributed analysis
• Advertisement 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
• Large-volume data processing |
<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>
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<td>1.0</td>
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<tr>
<td>ecs.n1.small</td>
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<td>2.0</td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>ecs.n1.medium</td>
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<td>4.0</td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>ecs.n1.large</td>
<td>4</td>
<td>8.0</td>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n1.xlarge</td>
<td>8</td>
<td>16.0</td>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n1.3xlarge</td>
<td>16</td>
<td>32.0</td>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n1.7xlarge</td>
<td>32</td>
<td>64.0</td>
<td>None</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>None</td>
<td>1</td>
</tr>
<tr>
<td>ecs.n2.medium</td>
<td>2</td>
<td>8.0</td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>ecs.n2.large</td>
<td>4</td>
<td>16.0</td>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n2.xlarge</td>
<td>8</td>
<td>32.0</td>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n2.3xlarge</td>
<td>16</td>
<td>64.0</td>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>ecs.n2.7xlarge</td>
<td>32</td>
<td>128.0</td>
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</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>
<td>1</td>
<td>8.0</td>
<td>None</td>
<td>1</td>
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<td>ecs.e3.medium</td>
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<td>16.0</td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>ecs.e3.large</td>
<td>4</td>
<td>32.0</td>
<td>None</td>
<td>2</td>
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<td>ecs.e3.xlarge</td>
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<td>64.0</td>
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<td>ecs.e3.3xlarge</td>
<td>16</td>
<td>128.0</td>
<td>None</td>
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</tr>
</tbody>
</table>
Generation 1 instance families

Generation 1 instance families include t1, s1, s2, s3, m1, m2, c1, and c2. All these instance families are legacy shared instance families. They are categorized based on the number of vCPUs such as 1, 2, 4, 8, or 16.

Features

- Equipped with Intel Xeon E5-2420 processors with the clock speed no less than 1.9 GHz.
- Uses the 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 categories 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>
<td>4</td>
</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>
<td>16</td>
<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>
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</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>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Standard</td>
<td>ecs.s1.small</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ecs.s1.medium</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>ecs.s1.large</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>ecs.s2.small</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
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<td>ecs.s2.large</td>
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<td>4</td>
</tr>
<tr>
<td></td>
<td>ecs.s2.xlarge</td>
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<tr>
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<td>ecs.s2.2xlarge</td>
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<td>16</td>
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<tr>
<td></td>
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<td>4</td>
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<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>
<td>16</td>
<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>
12 ECS instance FAQ

This topic provides answers to commonly asked questions about ECS instances.

- **FAQ about purchasing instances**
  - How do I check whether instances are available for purchase in a specific region or zone?
  - What can I do if no resources are available for purchase when I am trying to create an ECS instance?
  - How do I select an ECS instance that is suitable for my business?
  - How long does it take to create an ECS instance?
  - I paid for an ECS instance but no ECS instance was created. Why?
  - Why are some instance types unavailable on the instance buy page when I attempt to purchase a pay-as-you-go instance?

- **FAQ about enterprise-level instances**
  - What are enterprise-level instances? What are shared instances?
  - What are the differences between enterprise-level and shared instances?
  - Which are enterprise-level instance families? Which are shared instance families?
  - In what business scenarios do I need to purchase enterprise-level instances?
  - How is the network performance of enterprise-level instances?
  - What disk categories do enterprise-level instances support?
  - What image types do enterprise-level instances support?
  - What are the limits on upgrading or downgrading enterprise-level instances?
  - Can I upgrade a shared instance to an enterprise-level instance?
• FAQ about GPU instances
  - 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?
  - Why doesn't the Windows Graphics support graphics-related applications such as DirectX?
  - 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?
  - Why do I encounter a blue-screen error when I start an instance that uses an Alibaba Cloud Marketplace image pre-installed with an AMD driver?
  - Do GPU instances support Android emulators?
  - Can I upgrade or downgrade GPU instances?
  - Do pay-as-you-go GPU instances support the No Fees for Stopped Instances (VPC-Connected) feature?
  - How do I view GPU monitoring data?
• FAQ about ECS Bare Metal Instances
  - What are the differences between ECS Bare Metal Instances, traditional cloud hosts (virtual machines), and traditional physical machines?
  - How is the network performance of ECS Bare Metal Instances?
  - What disk categories are supported on ECS Bare Metal Instances? How many data disks can be attached to an ECS Bare Metal Instance?
  - Can ECS Bare Metal Instances be upgraded or downgraded? Do they support the failover feature?
• FAQ about SCC
  - How do I create an SCC instance?
  - How are SCC instances billed?
  - How do I create an SCC by using E-HPC?
  - How is SCC RDMA used?
FAQ about preemptible instances

- My account has no overdue payments. Why have my preemptible instances been released?
- Will I be notified when preemptible instances are released? How?
- Can the data of a preemptible instance be automatically retained when the instance is released?
- Can I cancel or reschedule the automatic release of a preemptible instance?
- Can preemptible instances be converted into subscription instances?
- To what resources are the prices of preemptible instances applicable?
- How do I bid for a preemptible instance?
- What is the relationship between the configured maximum price per hour of a preemptible instance and the current market price?
- Will I be charged the same price for all preemptible instances that start at the same time?
- Will I be charged at a price fluctuating with the market price within the protection period of the preemptible instance?
- Can I view the current market price of an instance type when I purchase a preemptible instance?
- Can I view the historical prices of a preemptible instance type? How?
- Will preemptible instances continue to be billed after they are stopped?
- How many preemptible instances can be purchased under a single account?
- How do I increase my vCPU quota?
- Can I change the instance type of a preemptible instance?
- Which instance families support preemptible instances?
- In which regions can I create preemptible instances?
- Why is the Preemptible Instance option unavailable on the instance buy page when I attempt to purchase an ECS instance?
• FAQ about reserved instances

- What is a reserved instance?
- Will a reserved instance provide a resource reservation?
- What operating systems do reserved instances support?
- Which instance families do reserved instances support?
- Can reserved instances be applied to preemptible instances?
- Can I change the instance families of reserved instances?
- To what scenarios are zonal reserved instances applicable?
- To what scenarios are regional reserved instances applicable?
- How is the zone flexibility of reserved instances applied?
- How is the instance size flexibility of reserved instances applied?
- Do zonal reserved instances provide instance size flexibility?
- Do zonal reserved instances provide zone flexibility?
- Can I change a zonal reserved instance to a regional one?
- Can I change the scope of a reserved instance from one region to another?
- Can I use reserved instances across accounts?
- Can I use reserved instances to cover the storage and network charges of pay-as-you-go instances?
- Can I configure a reserved instance to be applied to a specific pay-as-you-go instance?
- How are reserved instances billed?
- When does a reserved instance take effect after I purchase it?
- When do reserved instances take effect after I modify, split, or merge them?
- Why isn't the No Upfront payment option displayed on the buy page?
- Can I change the payment option of a reserved instance?
- Can reserved instances be resold?
- Can I use reserved instances to cover the image costs of pay-as-you-go Windows instances?
- Can I use reserved instances to cover the image costs of pay-as-you-go Linux instances?
- Are the consumption details of reserved instances refreshed hourly?
- Can a reserved instance be applied to more than one pay-as-you-go instance at the same time?
• FAQ about connecting to instances
  - VNC
    ■ Does VNC allow multiple users to log on simultaneously?
    ■ What can I do if I forget the remote connection password?
    ■ Why can't I connect to VNC even after I reset my remote connection password?
    ■ I was prompted with an authentication failure when I attempted to connect to VNC. What can I do?
    ■ What can I do if a black screen appears while I am connected to VNC?
    ■ What can I do if I am unable to access VNC?
    ■ Why can't I use Internet Explorer 8 to access VNC?
    ■ When I use Firefox to access VNC, an error message is returned indicating that the secure connection has failed. What can I do?
    ■ How do I remotely log on to a Linux instance?
    ■ What are the default username and password for remote logon to the operating system of an ECS instance?
• FAQ about upgrading and downgrading instances
  - Can I upgrade subscription instances?
  - Can I upgrade pay-as-you-go instances?
  - How long does it take to upgrade an instance?
  - How is the fee for upgrading an ECS instance calculated?
  - Does upgrading ECS instances affect my cloud service configurations?
  - How do I upgrade ECS resources?
  - I have upgraded an instance but no changes have taken effect. Why?
• FAQ about managing instances
  - What can I do if I am unable to access a website running on an ECS instance?
  - My ECS instance was stuck in the Starting state, and AliyunService was disabled or deleted. What can I do?
  - How do I use f1 instances?
  - How do I upload files by using the FTP tool in macOS?
  - How do I apply for an ICP filing for my domain name after purchasing an ECS instance?
  - An ECS instance fails to load the kernel to start up. What can I do?
  - How do I change the logon password within an instance?
  - Why can't I add sound or video cards to ECS instances?
  - Can I transfer the unused time of an ECS instance to another ECS instance?
  - Do ECS instances provide databases by default?
  - Can I build a database on an ECS instance?
  - Do ECS instances support Oracle databases?
  - Are public IP addresses and private IP addresses independent? Can I specify or add IP addresses?
  - Can load balancing be implemented for a single ECS instance?
  - Can I change the region of an ECS instance?
  - Can I adjust the partition size of a purchased disk?
  - How do I view subscription ECS instances in all regions under my account?
  - When can I forcibly stop an ECS instance? What are the consequences?
  - Why can't I reactivate my ECS instance?
  - Why has an ECS instance with release protection enabled been automatically released from a scaling group?

• FAQ about instance security
  - What is the AliVulfix process in an ECS instance?
  - How do I defend ECS instances against attacks?
  - What security services does Alibaba Cloud provide?
• FAQ about using Linux instances
  - I have already renewed an expired Linux instance but I am still unable to access the website it hosts. What can I do?
  - How do I activate a Windows ECS instance within a VPC?
  - How do I check, partition, and format the data disks of a Linux instance?
  - How do I upload files to a Linux instance?
  - How do I change the owner and owner group of directories and files on a Linux instance?
  - How do I update the software source of Linux instances?
• FAQ about instance limits
  - What limits apply to the transfer and change of public IP addresses of ECS instances?
  - Can I access amazon.com from my ECS instance?
  - Why can't I access a website hosted outside mainland China after I log on to my ECS instance?
  - I cannot purchase more pay-as-you-go instances. What can I do?
  - How do I view resource quotas?
• FAQ about instance billing
  - Will fees still be incurred after a pay-as-you-go ECS instance is automatically stopped due to an overdue payment or is manually stopped?
  - What can I do if I am unable to place an order to change the billing method from pay-as-you-go to subscription?
  - How long after the order is paid does it take to change the billing method from pay-as-you-go to subscription?
  - What can I do if I am unable to change the billing method from pay-as-you-go to subscription?
  - When I change the billing method of an instance from pay-as-you-go to subscription, will the billing method for network usage of the instance change?
  - 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?
  - What can I do if I am unable to change the billing method from subscription to pay-as-you-go?
  - When I try to change the billing method of a disk in an ECS instance, an error message is returned indicating that I have already changed the billing method three times. What does this mean?
  - Why can't I change a pay-as-you-go instance to a subscription one?
  - How do I view the expiration time of a subscription instance?

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 within 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 of the preceding measures, try again later. Instance resources are dynamic. Alibaba Cloud replenishes insufficient resources as soon as possible.

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.

How long does it take to create an ECS instance?

It takes a minute or two 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 within the specified zone are insufficient to create an instance of your selected type, the instance will fail to be created. Your account will automatically be refunded for the cost of the 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 instance types unavailable on the instance buy page when I attempt to purchase a pay-as-you-go instance?

Some instance types with 16 or more vCPUs are available only to authorized accounts when the pay-as-you-go billing method is selected. If an instance type is available on the instance buy page when the subscription billing method is selected but unavailable when the pay-as-you-go billing method is selected, submit a ticket to check whether your account has been authorized to purchase pay-as-you-go instances of that instance type.

If your account has been authorized but the instance type is still unavailable, 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 shared 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 requirements of business stability.

Shared instances are a series of instance families that are targeted at small and medium-sized websites or individuals. Shared instances share resources, in contrast with enterprise-level instances that each have their own resources exclusively. As a result, shared instances do not provide consistent computing performance, but can be implemented at a lower cost.

What are the differences between enterprise-level and shared 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.
Shared 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. Shared 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 shared instance families?**

Among the instance families that are available for purchase, n4, mn4, xn4, and e4 are shared 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 are, the stronger network performance the instances can deliver. For more information about the network performance of different instance types, see Instance families.

**What disk categories do enterprise-level instances support?**

For the disk categories that enterprise-level instances support, see #unique_94/unique_94_Connect_42_section_d9f_cog_644.

**What image types do enterprise-level instances support?**

For the public images that enterprise-level instances support, see #unique_300.

You can also import custom images. For more information, see #unique_301.

**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 a shared instance to an enterprise-level instance?**

Yes, you can upgrade a shared 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 kernel and kernel-devel package versions are inconsistent, resulting 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 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 has been updated, restart the instance.

Why do I encounter a blue-screen error when I start 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 problem.

If you encounter a blue-screen error and cannot start the instance, enter Safe Mode. In Safe Mode, uninstall the existing driver, start Windows properly, 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?

GPU instances equipped with local disks, such as ga1 and gn5 instances, 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), gnSi (with NVIDIA P4 GPU processors), and gn6v (with NVIDIA V100 GPU processors) instances. For more information, see #unique_152.

How do I view GPU monitoring data?

You can log on to the CloudMonitor console or call the DescribeMetricList operation to view GPU monitoring data. For more information, see #unique_104.

What are the differences between ECS Bare Metal Instances, traditional cloud hosts (virtual machines), and traditional physical machines?

For information about the differences, see ECS Bare Metal Instances.

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 are, the stronger network performance the instances can deliver. For more information about the network performance of different ECS Bare Metal Instance types, see Instance families.

What disk categories 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 do support the failover feature. When the hardware hosting an ECS Bare Metal Instance fails, you can migrate the instance to another physical machine. Data is stored in the data disks of the 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. Create an SCC instance.
- If you want 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 SCC image 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?

Each preemptible instance has a protection period of one hour after creation. During the protection period, the preemptible instance cannot be released due to insufficient resources or fluctuations in market price. If the market price exceeds the specified maximum price or insufficient resources are available after the protection period ends, the preemptible instance will be automatically released.
Will I be notified when preemptible instances are released? How?

Yes, you will be notified when preemptible instances are released. When your preemptible instance needs to be released due to a market price change or insufficient resources, the instance will first enter the To Be Released state and then be automatically released in about 5 minutes.

You can use CloudMonitor to subscribe to notifications of preemptible instance being interrupted. For more information, see #unique_303.

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 the data of a preemptible instance be automatically retained when the instance is released?

No, the data of a preemptible instance cannot be automatically retained when the instance is released. When you no longer need a preemptible instance, we recommend that you back up your data and environment by following the instructions in Create a snapshot and then release the instance. You can purchase new preemptible instances at any time.

Can I cancel or reschedule the automatic release of a 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 prices of preemptible instances applicable?

The prices of preemptible instances are applicable only to instance types. Other 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 can set a maximum price per hour to bid for an instance type. If the maximum price per hour is greater than or equal to the current market price, the preemptible instance that you request is created and billed based on the current market price. For more information, see Create a preemptible instance.
What is the relationship between the configured maximum price per hour of a preemptible instance and the current market price?

If the configured maximum price per hour is greater than or equal to the current market price, the preemptible instance will be created and billed based on the current market price. Each preemptible instance has a protection period of one hour after creation. During the protection period, the instance cannot be automatically released due to insufficient resources or fluctuations in market price.

After the protection period ends, the system will check the market price and resource availability of the instance type every five minutes. If the market price exceeds the configured maximum price per hour or resources of the instance type are insufficient, the running preemptible instance will be released.

Will I be charged the same price for all preemptible instances that start at the same time?

Yes, you will be charged the same price for all preemptible instances that start at the same time.

Will I be charged at a price fluctuating with the market price within the protection period of the preemptible instance?

No, the hourly price of a preemptible instance is set at the beginning of each hour and is applied to the instance for that whole 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 view the current market price and historical prices of an instance type after you select it. The total price, including the fees for the instance type, storage, and bandwidth, is displayed at the bottom of the instance buy 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 an instance type to view its historical prices when you create a preemptible instance 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, preemptible instances will continue to be billed after they are stopped. When you no longer need a preemptible instance, we recommend that you back up your data and
environment by following the instructions in Create a snapshot 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 many preemptible instances can be purchased under a single 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 selecting an instance type. For more information, see Limits.

**How do I increase my vCPU quota?**

To increase your vCPU quota, 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 specific instance 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 within any region. If preemptible instances cannot be created within a specific region due to insufficient resources, try a different region.

**Why is the Preemptible Instance option unavailable on the instance buy page when I attempt to 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 operating systems. For example, a reserved Linux instance can be applied to any pay-as-you-go Linux instances that match its attributes regardless of image type (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, t5, and t6.

Burstable instances can match zonal reserved instances but cannot match regional reserved instances. Reserved instances that match burstable instances cannot be merged, be split, or changed in scopes. For more information, see Billing.

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 are running the following pay-as-you-go instance:
One ecs.c5.xlarge Linux instance in Qingdao Zone B. The instance is named C5PAYG-b.

You have purchased the following reserved instance:

One regional ecs.c5.xlarge reserved instance in the China (Qingdao) region. The reserved instance is named C5RI.

C5RI is matched to C5PAYG-b.

You release C5PAYG-b and start another Linux instance of the same instance type named C5PAYG-c in Qingdao Zone C. C5RI is then matched to 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 be matched to 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 be matched to one ecs.g5.xlarge pay-as-you-go instance to offset the bills of the pay-as-you-go instance for one year, or matched to one ecs.g5.2xlarge pay-as-you-go instance to offset the bills of the pay-as-you-go instance for six months.

**Do zonal reserved instances provide instance size flexibility?**

No, zonal reserved instances do not provide instance size flexibility. A zonal reserved instance can be matched only to pay-as-you-go instances of the same instance type as it.

**Do zonal reserved instances provide zone flexibility?**

No, zonal reserved instances do not provide zone flexibility. A zonal reserved instance can be matched only to pay-as-you-go instances in the same zone as it.

**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 of the China (Hangzhou) region or change the instance to a regional reserved instance of the region. However, you cannot change the instance to a regional or zonal reserved instance of 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 pay-as-you-go Windows instances, reserved instances also cover the image costs.

Can I configure a reserved instance to be applied to a specific pay-as-you-go instance?

No, you cannot configure a reserved instance to be applied to a specific pay-as-you-go instance. When multiple pay-as-you-go instances match the attributes of a reserved instance, the reserved instance is applied 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 it is purchased. You are charged based on your selected payment option regardless of whether the reserved instance is matched to 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. If you purchase a reserved instance with a term of one year at 2019-02-26 13:45:00, the reserved instance takes effect at 2019-02-26 13:00:00. Its billing also starts at that time. The reserved instance will expire at 2020-02-27 00:00:00. If you have matchable pay-as-you-go instances when you purchase the reserved instance, the billing discount will be applied to
bills generated for the pay-as-you-go instances starting from the hour of 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?

When reserved instances are modified, split, or merged, new reserved instances are generated and the original ones become invalid. At the top of the hour, the new reserved instances take effect and the original reserved instances become invalid. 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. At 2019-02-26 13:00:00, the term of RI1 ends and the terms of RI2 and RI3 starts. Starting from 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 are matched to pay-as-you-go instances immediately after they take effect, the billing discounts provided by RI2 and RI3 are also applied to the hourly bills of ecs.g5.xlarge pay-as-you-go instances starting from 2019-02-26 13:00:00.

Why isn't the No Upfront payment option displayed on the buy 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.

Can reserved instances be resold?

No, reserved instances cannot be resold.

Can I use reserved instances to cover the image costs of pay-as-you-go Windows instances?

Yes, reserved instances can be used to cover the image costs of pay-as-you-go Windows instances. This is because reserved Windows instances already include Windows image costs.

Can I use reserved instances to cover the image costs of pay-as-you-go Linux instances?

No, reserved instances cannot be used to cover the image costs of pay-as-you-go Linux instances.

Are the consumption details of reserved instances refreshed hourly?

Yes, the consumption details of reserved instances are refreshed hourly. You can view the list, consumption details, and matched pay-as-you-go instances of reserved instances in the User Center. For more information, see View the usage details of a reserved instance.
Can a reserved instance be applied to more than one pay-as-you-go instance at the same time?

Yes, a reserved instance can be applied to more than one pay-as-you-go instance at the same time. The reserved instance checks for deductible pay-as-you-go bills on an hourly basis and deduct fees based on its computing power.

**Note:**
The computing power and term of each reserved instance is fixed. You cannot increase the computing power of a reserved instance by shortening its term.

Assume that you have a reserved instance with the following attributes:

- c5.large instance type
- Instance count of 1 (indicates that the reserved instance can match one pay-as-you-go instances of the specified instance type.)
- One-year term

The following examples demonstrate how the reserved instance is applied based on the pay-as-you-go instances that exist:

- Six c5.large pay-as-you-go instances exist for one hour each. Each of these pay-as-you-go instances consumes one hour of computing power equal to the amount of computing power that the c5.large reserved instance can deliver every hour. The reserved instance will be applied randomly to one of the pay-as-you-go instances. You cannot configure the reserved instance to be applied to all six pay-as-you-go instances by shortening the term of the reserved instance to two months.
- Six c5.large pay-as-you-go instances exist for 10 minutes each. The six instances consume 10 minutes of computing power each and in total consume the equivalent computing power that the c5.large reserved instance can deliver every hour. The reserved instance will be applied to all six pay-as-you-go instances.
- Six c5.large pay-as-you-go instances exist for 15 minutes each. The six instances consume 15 minutes of computing power each, in total exceeding the amount of computing power that the reserved instance can deliver every hour. The reserved instance will be applied randomly to the pay-as-you-go instances to offset the charges for one-hour computing power.

**Does VNC allow multiple users to log on simultaneously?**

No, VNC allows only a single user to log on at a time.
What can I do if I forget the remote connection password?

You can reset your remote connection password. For more information, see Modify the VNC password.

Why can't I connect to VNC even after I reset my remote connection password?

If the instance to which you are connecting is not I/O optimized, you must restart the instance by using the ECS console or by calling the RebootInstance operation for the new password to take effect.

**Note:**
If you restart the instance from within the instance itself, the new password will not take effect.

I was prompted with an authentication failure when I attempted to connect to VNC. What can I do?

Authentication will fail if the entered password is not correct. Perform the following troubleshooting operations:

1. Enter the correct remote connection password.
2. If you forget your password, you can reset it and try again. For more information, see Modify the VNC password.

**Note:**
If the instance to which you are connecting is not I/O optimized, you must restart the instance by using the ECS console or by calling the RebootInstance operation for the new password to take effect.

What can I do if a black screen appears while I am connected to VNC?

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 VNC page, choose Send Remote Call > CTRL+ALT+DELETE to open the logon dialog box.
What can I do if I am unable to access VNC?

You can use a browser to access VNC for troubleshooting. For example, use Google Chrome to access VNC, and press the F12 key to open the developer tools pane. Then click the **Console** tab and identify errors based on the information displayed.

Why can't I use Internet Explorer 8 to access VNC?

VNC 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 VNC, an error message is returned indicating that the secure connection has failed. What can I do?

This problem occurs if the encryption algorithm used by your version of Firefox is different from that of VNC.

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 support 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 from the console.
- Connect to a Linux instance by using a username and password.
- Connect to a Linux instance by using an SSH key pair.
- Connect to a Linux instance from a mobile device.

What are the default username and password for remote logon to the operating system of an ECS instance?

The default username varies with 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 the password, you can reset it. For more information, see [Reset the logon password of an instance](#).
This password is used to remotely log on to the operating system of an ECS instance, not to VNC.

**Can I upgrade subscription instances?**

Yes, you can upgrade subscription instances. 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 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.
- You can upgrade the bandwidths of instances without stopping the instances. 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 in the ECS console when you upgrade the instance. You can also view the billing details on the Account Overview page.

**Does upgrading 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 configurations to take effect. The upgrade operation will interrupt the services running on the instance 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 information 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 the instances 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 Mbit/s and can range 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. Why?**

After you upgrade an instance, you must restart the instance in the ECS console for the new configurations to take effect.

**What can I do if I am unable to access a website running on an ECS instance?**

For information about how to solve this problem, see Unable to access the websites running on ECS Instances.

If the problem persists, submit a ticket.

**My ECS instance was stuck in the Starting state, and AliyunService was disabled or deleted.**

**What can I do?**

Problem description: After you started an ECS instance, it remained in the Starting state for an extended period of time and then automatically stopped. You logged on to the instance and found that AliyunService was deleted or disabled in the system services.

Solution:

• If AliyunService was disabled:
  1. Change the state of AliyunService to automatic.
  2. Restart the instance.

• If AliyunService was deleted:
  1. Run the following command to add AliyunService back 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 after the equal sign (=).

  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 f1 instance constraint files 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 the development is completed, generate an intermediate QAR file during the compilation stage and upload the file to an OSS bucket. Currently, you can only upload this file to an OSS bucket within 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 will verify the registration request for the QAR file and then send an email including an FPGA image ID.

3. To 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 the 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 you initiate 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_306
- #unique_307

How do I upload files by using the FTP tool in macOS?

Method 1: 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.

   ![FTP server connection](image1.png)

   220 Welcome to www.net.cn FTP service.
   Name (guest:guest): guest
   331 Please specify the password.
   Password:
   230 Login successful.
   Remote system type is UNIX.
   Using binary mode to transfer files.
   ftp> dir

   227 Entering Passive Mode (121,42,75,25,156,83)
   150 Here comes the directory listing.
   drwxr-xr-x 2 0 0 4096 Jan 13 20:30 backup
   drwxr-xr-x 2 521 100 4096 Jan 13 20:30 cgi-bin
   drwxr-xr-x 2 0 0 4096 Jun 03 03:40 ftplogs
   drwxr-xr-x 20 521 100 4096 May 26 16:13 htdocs
   drwxr-xr-x 2 521 100 4096 Jan 13 20:30 myfolder
   drwxr-xr-x 2 0 0 4096 Jun 03 02:03 wwwlogs
   -rw-r--r-- 1 0 0 606 Feb 03 15:47 请先读我.txt
   ftp> cd htdocs

2. Access 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.

```
ftp> put wordpress.tar
local: wordpress.tar remote: wordpress.tar
227 Entering Passive Mode (121,42,75,25,156,121)
150 Ok to send data.
226 File receive OK.
6720564 bytes sent in 46.2 secs (145.49 Kbytes/sec)
```

Method 2: 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 different port number that 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 files and click the Upload icon to upload the 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 authorized developers" when you try to install Yummy FTP, perform the following steps:

- **a.** Choose System Preference > Security and Privacy.
- **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_308.

For information about how to apply for an ICP filing, see #unique_309.
An ECS instance fails to load the kernel to start up. What can I do?

Problem description: The system does not respond when you select an option from the GRUB menu during startup. After mounting the LiveCD image to the ECS instance, you have already logged on to the instance and verified that the file system privileges are correct and that the message logs show no exceptions.

Cause: The system has been attacked by ransomware.

Solution: Back up your data and reinitialize the system.

For more information, see Recover from ransomware attacks.

How do I change the logon password within an instance?

For information about how to change the logon password within an instance, see Change the logon password of an instance by connecting to the instance.

Why can't I add sound or video cards to ECS instances?

The servers that Alibaba Cloud ECS provides are not multimedia servers and do not provide sound card or video card components by default.

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 databases by default?

No, ECS instances do not provide databases 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 purchase ApsaraDB for RDS separately.
Do ECS instances support Oracle databases?

Yes, ECS instances support Oracle databases. Before installing an Oracle database, we recommend that you perform a performance stress test on the target ECS instance to ensure that the instance can satisfy 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 between ECS instances and OSS or ApsaraDB for RDS instances. When a bandwidth of 0 Mbit/s is selected for an ECS instance, no public IP address is allocated to the instance. In normal cases, 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 add IP addresses by specifying or automatically assigning secondary private IP addresses to ENIs.

Can load balancing be implemented for a single ECS instance?

Both Linux and Windows ECS instances can be load-balanced. 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 for as few as one ECS instance under an account. However, we recommend you implement load balancing with two or more ECS instances.

Can I change the region of an ECS instance?

No, you cannot change the region of an ECS instance. If you want to change the region of an ECS instance, you can use the ACS-ECS-CloneInstancesAcrossRegion public template provided by Operation Orchestration Service (OOS) to copy the instance to another region. The new instance and the original instance have identical disk data but different IP addresses.

Can I adjust the partition size of a purchased disk?

For system security and stability purposes, system disks cannot be repartitioned on neither Windows nor Linux instances. If you use a third-party tool to perform repartitioning, unknown exceptions such as system failure and data loss might occur.

Repartitioning data disks may cause data loss. We do not recommend that you repartition data disks.
How do I replace the automatically assigned public IP address of an ECS instance with an Elastic IP address (EIP)?

To replace the automatically assigned public IP address of an ECS instance with an EIP, ensure that you have selected pay-by-bandwidth as the billing method for network usage for the instance and that you have purchased an EIP. Then, use one of the following methods to make the replacement:

- **Method 1**
  1. Change the billing method for network usage from pay-by-bandwidth to pay-by-traffic. For more information, see #unique_149.
  2. Convert the automatically assigned public IP address of the ECS instance into an EIP. For more information, see #unique_310.
  3. Disassociate the EIP obtained in the previous step from the ECS instance. For more information, see #unique_311.
  4. Associate the EIP that you purchased to the ECS instance. For more information, see #unique_312.

- **Method 2:**
  In the OOS console, use the ACS-ECS-ConvertsPublicIPToNewEIPByInstanceId template to replace the public IP address of the ECS instance with an EIP. To perform this operation in the China (Hangzhou) region, access ACS-ECS-ConvertsPublicIPToNewEIPByInstanceId. You can click this link to access the template in the OOS console and select China (Hangzhou) from the top navigation bar.

How do I view subscription ECS instances in all regions under my account?

You can go to the renewal page to view subscription ECS instances in all regions under your account.

1. Log on to the ECS console.
2. In the top navigation bar, choose Billing > Renew.

When can I forcibly stop an ECS instance? What are the consequences?

If an instance cannot be stopped through 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?

An instance may fail to be reactivated 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.
- No 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 by a scale-out event even if release protection has been enabled for the instance from the ECS console or by calling the `#unique_139` 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](#).
I have already renewed an expired Linux instance but I am still unable to access the website it hosts. What can I do?

Problem description: A Linux ECS instance is in the Stopped state after it has expired. After you have renewed and restarted the instance, you still cannot access the website it hosts.

Cause: This may be because the website service has not been started.

Solution:

1. Connect to the instance and run the following command to check whether the website service has been started:

```
# netstat -nltp //Check whether port 80 on the 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.

     ```
     #/etc/init.d/httpd start          //Start the website service. This command is applicable to Apache.
     #/etc/init.d/mysqld start         //Start MySQL.
     ```

   - In NGINX, you must start the website service, PHP, and MySQL.

     ```
     #/etc/init.d/nginx start          //Start the website service. This command is applicable to NGINX.
     #/etc/init.d/php-fpm start        //Start PHP.
     #/etc/init.d/mysqld start         //Start MySQL.
     ```

3. Re-check whether the website service has been started.

```
#netstat -nltp //Check whether port 80 on the 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 activate a Windows ECS instance within a VPC?

To activate a Windows ECS instance within a VPC, you must use a specific KMS domain name. For more information, see How to activate the VPC-Connected Windows instances using KMS servers.

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 information about how to partition and format disks in Linux instances, see #unique_199.

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 occurs when you access a website hosted on the instance. 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 the /alidata/www/phpwind directory 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 can be changed within 6 hours after the instance is created, and can be changed a maximum of 3 times. For more information, see #unique_313.
  - If Anti-DDoS Pro is deployed on your instance, you can change the IP address of an ECS instance a maximum of 10 times from the Anti-DDoS Pro console. For more information, see the #unique_314 section of the Anti-DDoS Pro User Guide.

• In VPCs:
  - You cannot transfer public IP addresses or EIPs across accounts.
  - If no public IP address has been 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 has been assigned to your instance:
    ■ This public IP address can be changed within 6 hours after the instance is created, and can be changed a maximum of 3 times. For more information, see #unique_313.
    ■ You can replace this public IP address by converting it into an EIP. For more information, see #unique_315.

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 the instance can connect to the public network properly.

**Why can’t I access a website hosted outside mainland China after I log on to my ECS instance?**

You can access a website hosted outside mainland China from your ECS instance only when the website complies with the laws, regulations, and regulatory requirements of the country or region where your instance is located. Ensure that your ECS instance can connect to the public network properly and that the website complies with the preceding laws, regulations, and regulatory requirements.

**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
Limits. You can log on to the ECS console and view your resource quotas on the privileges and quotas page. For more information, see #unique_316.

How can I view the resource quota?

For more information about how to view the limits and quotas of resources, see #unique_157.

Will fees still be incurred after a pay-as-you-go ECS instance is automatically stopped due to an overdue payment or is manually stopped?

When a payment for a pay-as-you-go instance becomes overdue, the instance will be automatically stopped and taken out of service.

You can stop a running pay-as-you-go instance from 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: You can enable the No Fees for Stopped Instances (VPC-Connected) feature. After the feature is enabled, billing of pay-as-you-go instances within VPCs will start when the instances are created, stop when the instances enter the Stopped state, and resume when the instances are started again. When an ECS instance enters the Stopped state, the No Fees for Stopped Instances (VPC-Connected) feature stops only the vCPUs, memory, and public IP address of the instance from incurring fees. The data disks of the instance will continue to be billed. For more information, see #unique_152.
- 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 I am unable to place an order to change the billing method from pay-as-you-go to subscription?

You may be unable to place the order due to one of the following reasons:

- The instance is in a state that does not support changes to the billing method.
- Changes to the billing method are not allowed due to an upcoming scheduled automatic release.
- Changes to the billing method are not allowed because the instance is in the Expired state.
- Changes to the billing method are not allowed because the instance information has changed.
- A previous order to change the billing method of the instance has not been paid.
If one of the preceding errors is reported, 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?**

The billing method of your ECS instance will be changed after you pay for the order. It takes up to 4 seconds to change the billing method of 20 instances. After the change is completed, you can see that the billing method of your instance has been changed to **Subscription** in the console.

**What can I do if I am unable to change the billing method 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 for network usage of the instance change?**

No, the billing method for network usage of the instance 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 billing method for network usage, 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?**

The existing 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 to complete the change. If you upgrade the instance before the order is paid for, the order payment cannot be completed because the instance components are different and the original order no longer matches. If you still want to change the billing method, you must cancel the unpaid order and place a new order.

**What can I do if I am unable to change the billing method from subscription to pay-as-you-go?**

You may be unable to change the billing method from subscription to pay-as-you-go due to one of the following reasons:

- The instance is in a state that does not support changes to the billing method.
- Changes to the billing method are not allowed because the instance is in the **Expired** state.
Changes to the billing method are not allowed because the instance information has changed.

If one of the preceding errors is reported, adjust the instance accordingly. If the problem persists, submit a ticket.

**When I try to change the billing method of a disk in an ECS instance, an error message is returned 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 ECS instance for which you want to change the billing method 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.

**How do I view the expiration time of a subscription instance?**

You can log on to the ECS console and go to the **Instances** page. View the expiration time of your subscription instance in the **Billing Method** column.

**Note:**

If the **Billing Method** column is not displayed, click the icon in the upper-right corner of the instance list. In the dialog box that appears, select **Billing Method** and click **OK.**