

## Knowledge Point Percentage

Key Points	Percentage
Cloud Computing Basics	14%
HUAWEI CLOUD Overview	7%
Compute Cloud Services	21%
Network Cloud Services	21%
Storage Cloud Services	18%
Database, Security, CDN, and EI Services	10%
HUAWEI CLOUD O&M Basics	9%

### Knowledge points

#### Cloud Computing Basics

- Cloud Computing Basics
  - Cloud Computing Basics
  - Cloud Computing Technologies

#### HUAWEI CLOUD Overview

- HUAWEI CLOUD Overview
  - HUAWEI CLOUD Overview
  - Application Scenarios
  - Delivery Modes
  - Technical Support
  - Ecosystem
  - Quick Start

#### Compute Cloud Services

- Compute Cloud Services
  - Elastic Cloud Server (ECS)
  - Bare Metal Server (BMS)
  - Image Management Service (IMS)
  - Auto Scaling (AS)
  - Cloud Container Engine (CCE)
  - Other Compute Services

#### Network Cloud Services

- Network Cloud Services
  - Virtual Private Cloud (VPC)
  - Elastic Load Balance (ELB)
  - Virtual Private Network (VPN)
  - NAT Gateway
  - Other Services

#### HUAWEI CLOUD O&M Basics

- HUAWEI CLOUD O&M Basics
  - O&M Basic Concepts and Principles
  - Cloud Eye
  - Log Tank Service (LTS)
  - Cloud Trace Service (CTS)

#### Storage Cloud Services

- Storage Cloud Services
  - Elastic Volume Service
  - Object Storage Service
  - Scalable File Service

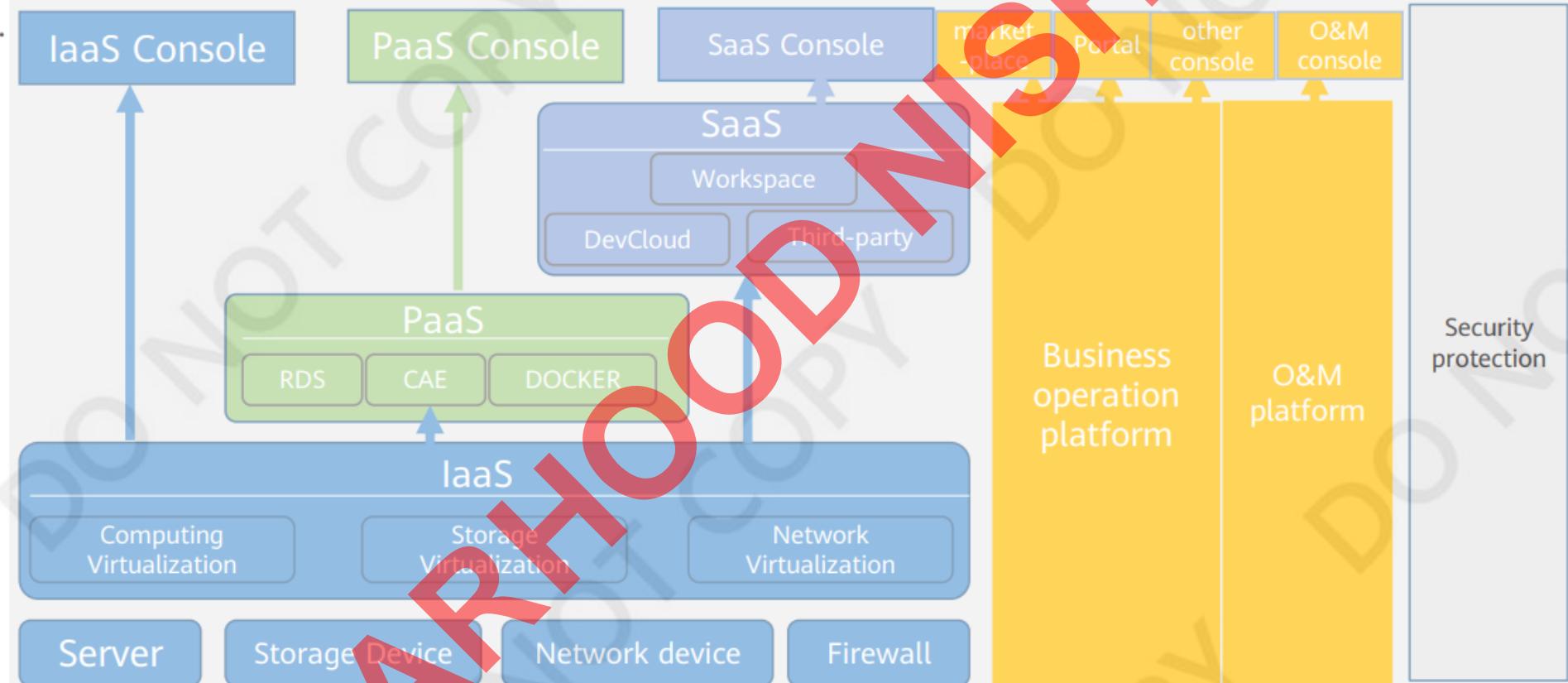
#### Database, Security, CDN, and EI Services

- Database, Security, CDN, and EI Services
  - Database Services
  - Security Services
  - Content Delivery Network (CDN)
  - EI Services

Exam Duration	90min
Passing score/Total score	600/1000

# Public Cloud Architecture

- The following figure shows the common public cloud architecture, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). Software as a Service (SaaS), O&M, operation, and security.



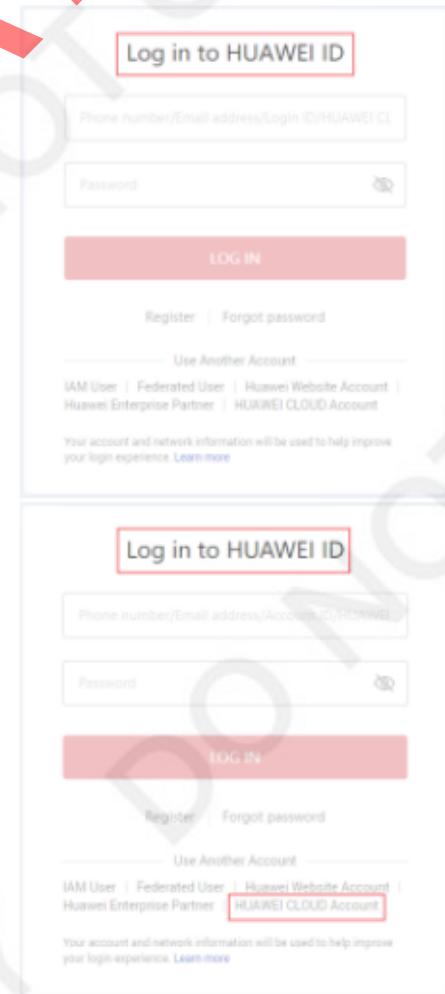
# HUAWEI CLOUD Basic Concepts – Account

- The HUAWEI CLOUD account system consists of two types of accounts:
  - Accounts: registered or created on HUAWEI CLOUD. An account has the highest permissions on HUAWEI CLOUD. It can access all of its resources and pays for the use of these resources. Accounts include HUAWEI IDs and HUAWEI CLOUD accounts.
  - IAM users: created and managed using an account in IAM. The account administrator grants permissions to IAM users and makes payment for the resources they use. IAM users use resources as specified by the permissions.
- Users can log in to HUAWEI CLOUD using a HUAWEI ID, Huawei website account, Huawei enterprise partner account, or HUAWEI CLOUD account, and use their resources and cloud services.
- If Users are an IAM user created by an account or a user of a third-party system that has established a trust relationship with HUAWEI CLOUD, log in to HUAWEI CLOUD through the corresponding page and then use resources and cloud services as specified by the permissions granted by the account.



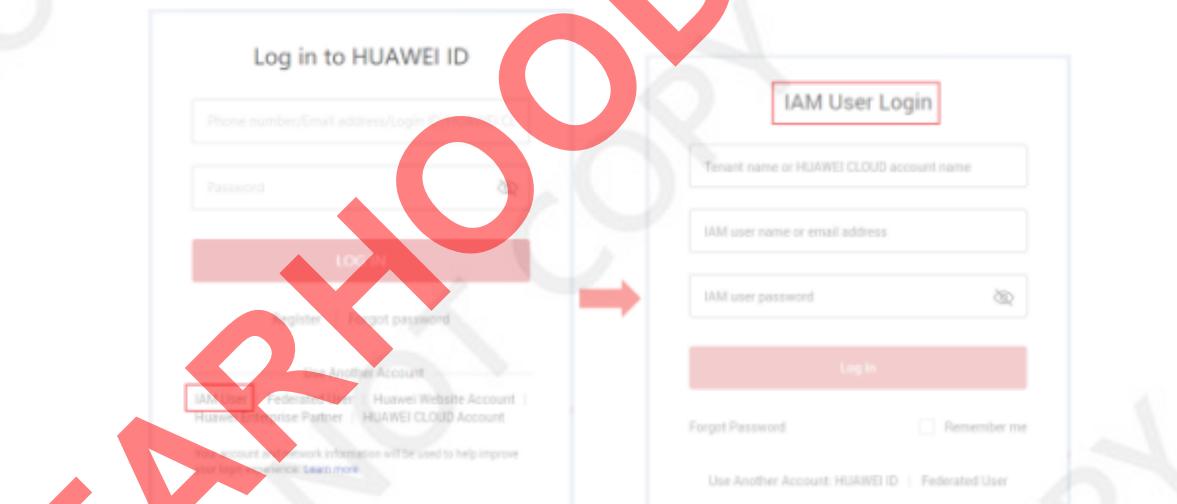
# Huawei ID and HUAWEI CLOUD Account

- You can register a HUAWEI ID to access all Huawei services, such as HUAWEI CLOUD and Vmall.
  - **Registration:** Register a HUAWEI ID on any Huawei service website, such as the HUAWEI ID website.
  - **HUAWEI CLOUD login:** Log in to HUAWEI CLOUD by clicking HUAWEI ID. If this is the first time you log in to HUAWEI CLOUD with a HUAWEI ID, enable HUAWEI CLOUD services or bind the HUAWEI ID to your HUAWEI CLOUD account by following the on-screen prompts.
- HUAWEI CLOUD accounts can only be used to log in to HUAWEI CLOUD.
  - **Registration:** To improve login experience, we have unified our account system. You can only register HUAWEI IDs on HUAWEI CLOUD from October 30, 2021.
  - **HUAWEI CLOUD login:** Log in to HUAWEI CLOUD by clicking HUAWEI ID or HUAWEI CLOUD Account.



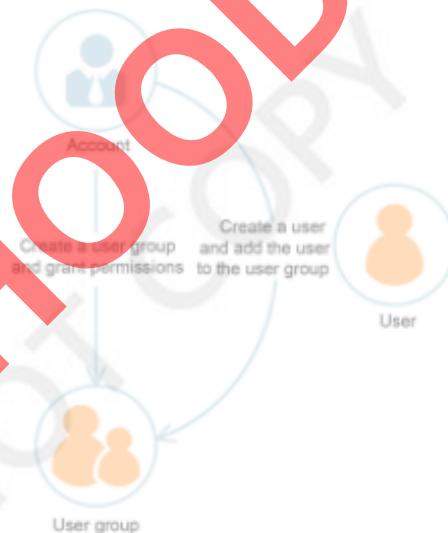
# IAM User

- Huawei Cloud Identity and Access Management (IAM) provides permissions management to help you securely control access to your cloud services and resources. If you want to share resources with others but do not want to share your own account and password, you can create an IAM user.
  - You can use your account to create IAM users and assign permissions for specific resources. Each IAM user has their own identity credentials (passwords or access keys) and uses cloud resources based on assigned permissions. IAM users cannot make payments themselves.
  - IAM users do not own resources and cannot make payments. Any activities performed by IAM users in your account are billed to your account.



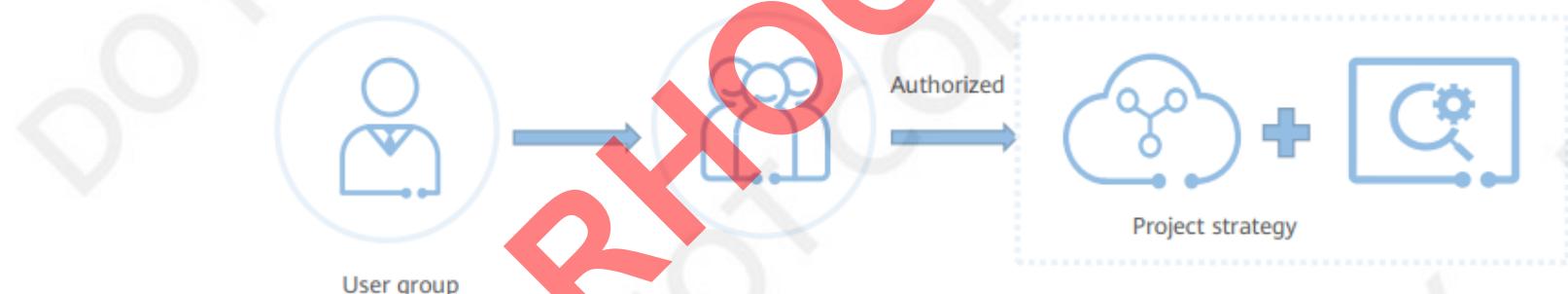
# User Group

- You can use user groups to assign permissions to IAM users.
  - After an IAM user is added to a user group, the user has the permissions of the group and can perform operations on cloud services as specified by the permissions.
  - If a user is added to multiple user groups, the user inherits the permissions assigned to all these groups.
  - The default user group **admin** has all permissions required to use all of the cloud resources. Users in this group can perform operations on all the resources, including but not limited to creating user groups and users, modifying permissions, and managing resources.



# Permission

- You can grant permissions by using roles and policies.
  - Roles: A coarse-grained authorization strategy provided by IAM to assign permissions based on users' job responsibilities. Only a limited number of service-level roles are available for authorization.
  - Policies: A fine-grained authorization strategy that defines permissions required to perform operations on specific cloud resources under certain conditions. IAM supports both system-defined and custom policies.
    - system-defined policy defines the common actions of a cloud service. System-defined policies can be used to assign permissions to user groups, and cannot be modified.
    - Custom policies function as a supplement to system-defined policies. You can create custom policies using the actions supported by cloud services for more refined access control. You can create custom policies in the visual editor or in JSON view.



# Agency

- A trust relationship that you can establish between your account and another account or a cloud service to delegate resource access.
  - Account delegation: You can delegate another account to implement O&M on your resources based on assigned permissions.
  - Cloud service delegation: Huawei Cloud services interwork with each other, and some cloud services are dependent on other services. You can create an agency to delegate a cloud service to access other services.

The screenshot shows the 'Create Agency' interface. It includes fields for 'Agency Name' (input: Agency), 'Agency Type' (radio buttons: Account selected, Cloud service), 'Delegated Account' (input: Specified account), 'Validity Period' (dropdown: Unlimited), and a 'Description' text area (input: Provide a brief description). At the bottom are 'Next' and 'Cancel' buttons.

# Huawei Cloud-Security Cloud Platform

- 100+ global security compliance certifications
  - Currently, HUAWEI CLOUD has passed various international authoritative certifications and practice standards. The following are some examples:
    - Security-related certifications include ISO 27001, ISO 27017, CSA STAR Gold Certification, China Ministry of Public Security Information Security Level 3/Level 4 Certification, PCI DSS for the payment card industry, and NIST CSF Cyber Security Framework.
    - The following privacy-related specifications are ISO 27018, ISO 27701, BS 10012, ISO 29151, and ISO 27799.
  - "3CS" is a new security governance system for the entire process of cloud services.
    - HUAWEI CLOUD has developed a governance system that covers mainstream cloud security standards in the industry and security management requirements of HUAWEI CLOUD. It is called Cloud Service Cybersecurity & Compliance Standard (3CS for short).
    - This governance system provides valuable reference solutions for enterprises or partners who are willing to learn from Huawei's practical experience.
  - DevSecOps, covering the entire lifecycle of services from development, deployment, to operation.
    - HUAWEI CLOUD seamlessly embeds the security lifecycle (SDL) into the new DevOps process with fast iteration, combining security R&D and O&M, ensuring cloud service security activities without affecting rapid continuous integration, release, and deployment.

# HUAWEI CLOUD Global Layout, High Speed Coverage, Powering Your Global Business

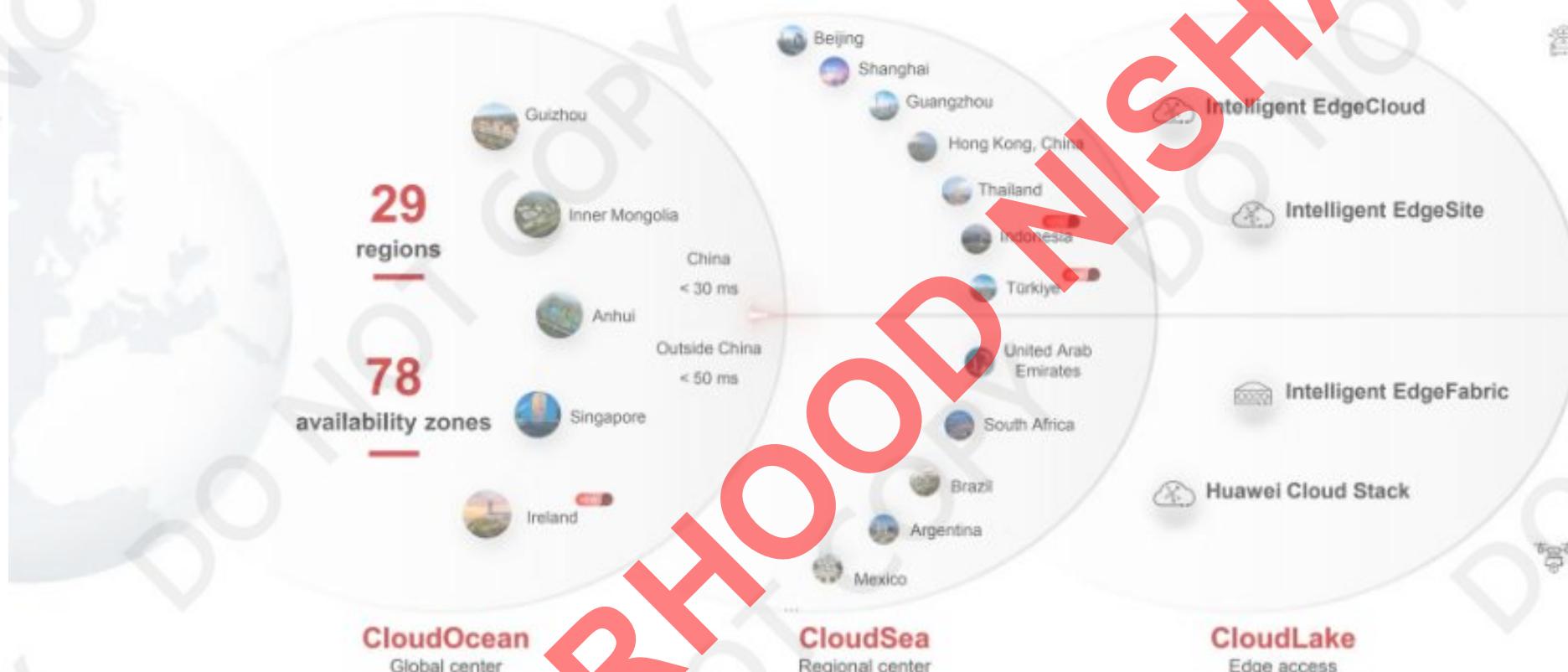
29  
Regions

71  
Availability  
Zones

2800+  
CDN nodes



# KooVerse: Storage, Compute, and Networking for the World



# Huawei Cloud Fundamentals (Compute, Storage, Networking) I

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# Compute Cloud Services



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# Computing cloud service

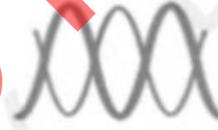
- A compute resource is a measurable amount of computing power that can be requested, allocated, and used for a compute activity. Common computing resources include the CPU and memory.
- A computing cloud service is a service or product that can provide computing resources on the cloud.



Elastic Cloud Server  
ECS



Bare Metal Server  
BMS



Auto Scaling  
AS



Image Management Service  
IMS



Cloud Container Engine  
CCE



Cloud Phone  
CPH



FunctionGraph



Dedicated Host  
DeH

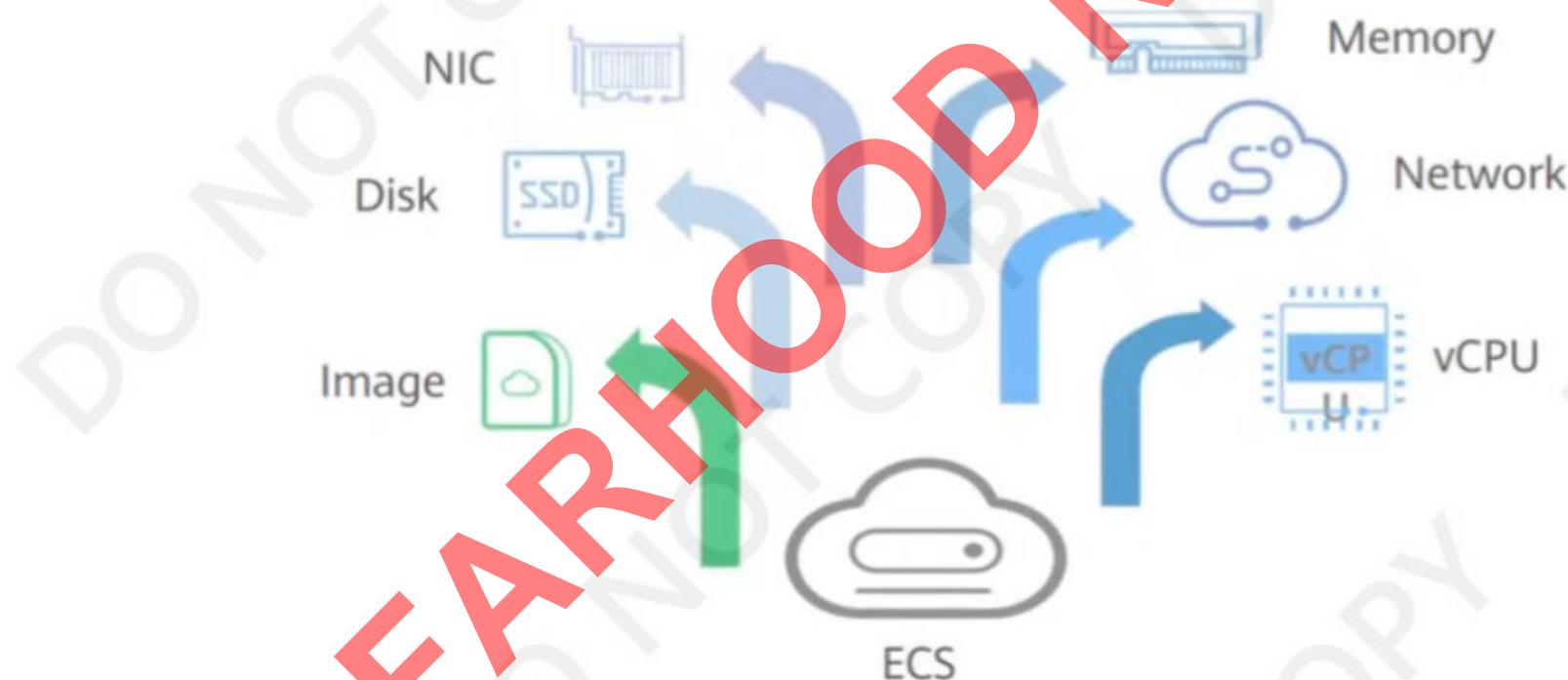
## Contents

1. Elastic Cloud Server (ECS)
2. Image Management Service (IMS)
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6. Other Compute Services

[No Title]

# What Is Elastic Cloud Server (ECS)?

- An ECS is a basic computing unit that consists of vCPUs, memory, an OS, and Elastic Volume Service (EVS) disks. After an ECS is created, you can use it on the cloud similarly to how you would use your local computer or physical server.



# ECS Advantages

## Scalability

- Automatic adjustment of compute resources
- Flexible adjustment of ECS configurations
- Flexible billing modes

## Reliability

- A variety of EVS disk types
- Reliable data
- Backup and restoration of ECSs and EVS disks

## Hardware and Software

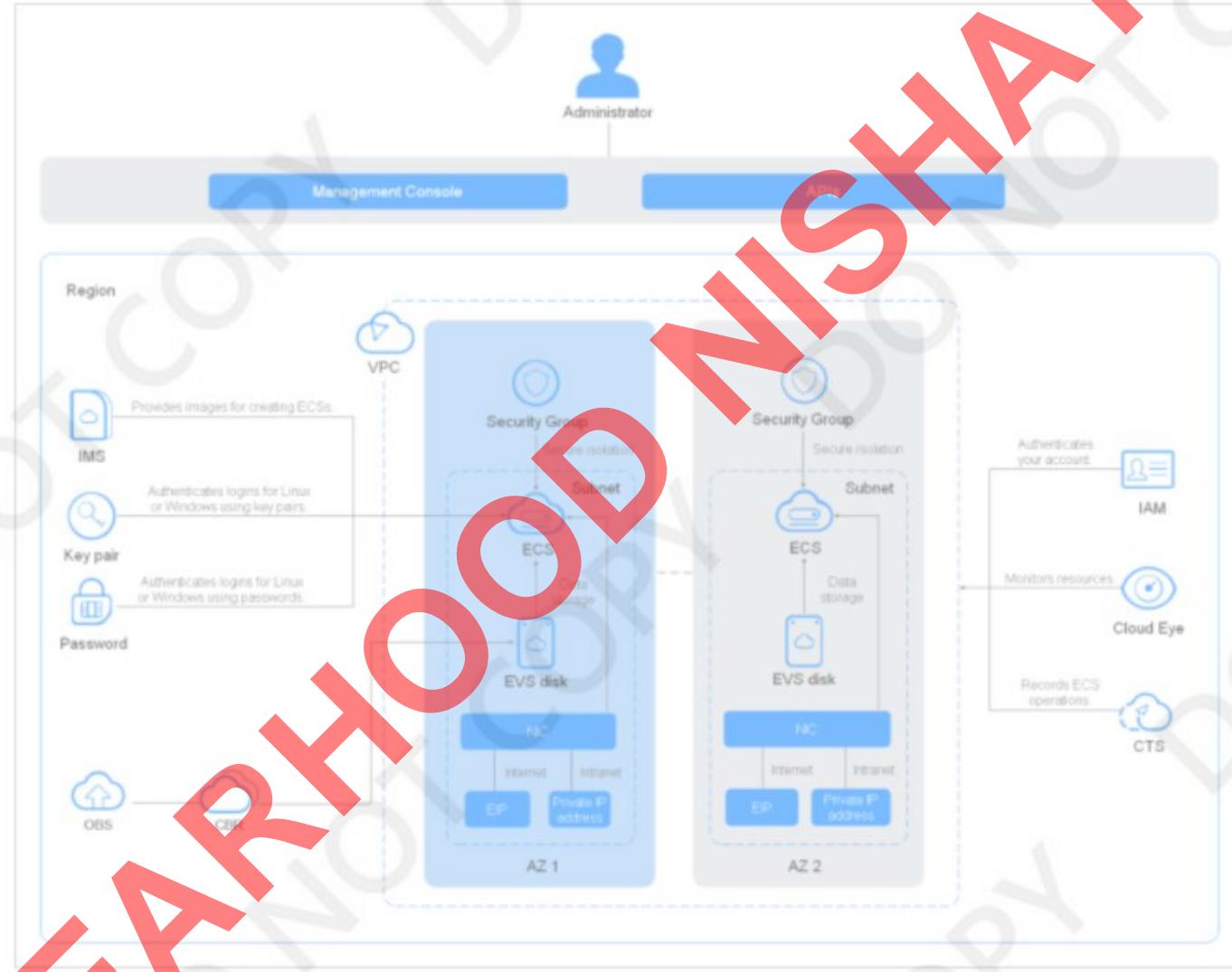
- Professional hardware devices
- Virtual resources accessible anytime, anywhere

## Security

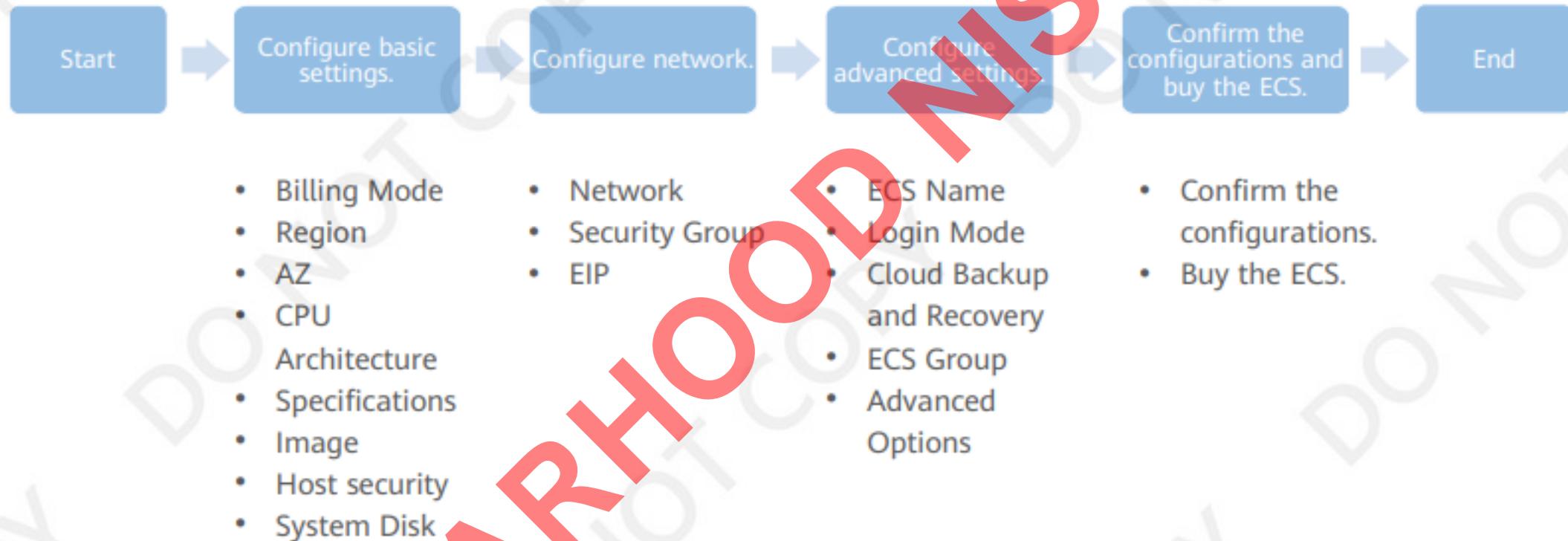
- A range of security services available for multi-dimensional protection
- Security evaluation
- Intelligent process management
- Vulnerability scans



# ECS Architecture



# Purchasing an ECS



# Configuring Basic Settings

- Set Billing Mode, Region, AZ, CPU Architecture, and Specifications.

The screenshot shows a user interface for configuring basic settings, likely for a cloud service. A large red diagonal watermark "FARHOOD NISHAT" is overlaid across the page.

**Region:** AP-Singapore (selected)

**Billing Mode:** Yearly/Monthly (selected)

**AZ:** Random (selected)

**Instance Selection:**

- CPU Architecture:** x86 (selected)
- Specifications:** Latest generation
- Image:** Public image

**Other Options:**

- vCPUs: Select vCPUs
- Memory: Select Memory
- Flavor Name: Search bar
- OS Selection: Select OS and Select OS version

## Billing Mode

- Yearly/Monthly
  - prepaid billing mode and is cost-effective for long-term use.
- Pay-per-Use
  - A postpaid billing mode in which an ECS will be billed based on usage frequency and duration.
- Spot price
  - Spot price ECSs are billed based on the market price, which varies according to the changes in supply and demand.

## Region

- Regions are divided based on geographical location and network latency. Public services, such as ECS, EVS, OBS, VPC, EIP, IMS, are shared within the same region.
- It is recommended that you select the closest region for lower network latency and quick access.



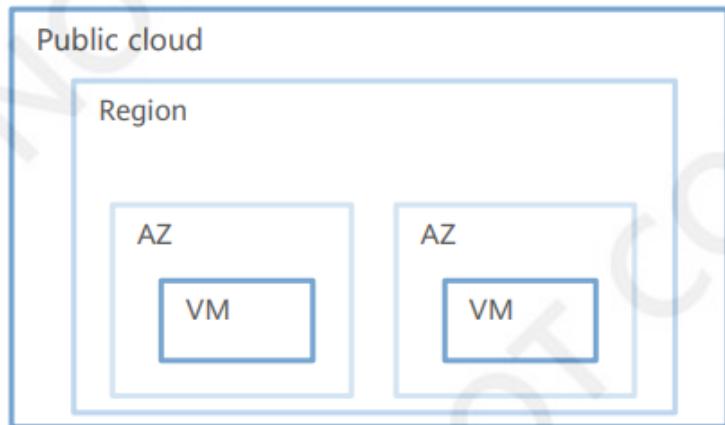
## Availability Zone

- An AZ contains one or more physical data centers. Each AZ has independent cooling, fire extinguishing, moisture-proof, and electricity facilities. Within an AZ, computing, network, storage, and other resources are logically divided into multiple clusters.



# Relationship Between Regions and AZs

Tenant view



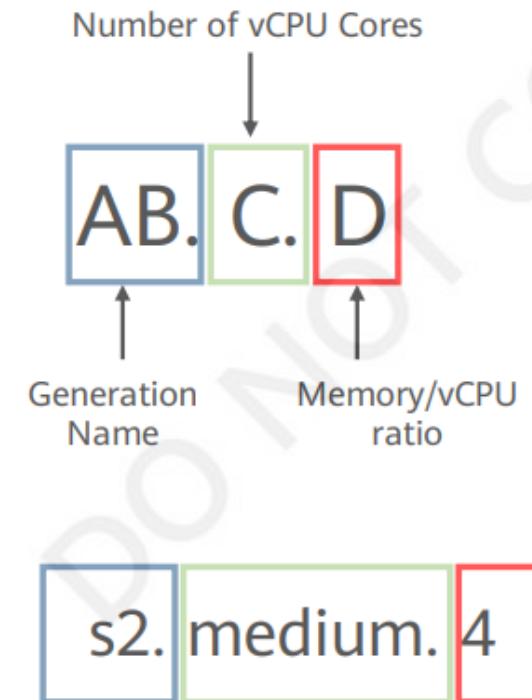
Physical View



Name	target	Description
Region	Users can select low-latency cloud data centers nearby, avoiding long-distance physical transmission delay.	The network latency to the nearest region is less than or equal to 100 ms. Inter-region network latency is greater than 10 ms, and intra-region network latency is 1–10 ms.
AZ	Physically isolated resource areas. Different AZs have independent wind, fire, and water resources.	The network latency in the AZ is less than 1 ms. The storage in the AZ can be shared. The distance between AZs ranges from 30 km to 200 km.
DC	Data center with the concept of physical location; A single DC can carry one or more sites. A single DC can have one or more Layer 2 networks.	Not visible to tenants. Currently, an AZ has only one DC and supports multiple DCs. The layer 2 network latency in a DC is equivalent to that in an AZ. The layer-3 network latency in a DC is equivalent to the latency in a region.

# Specifications

- ECS specifications refer to ECS configurations, including the CPU, memory, bandwidth, disk, and OS.
- AB indicates the ECS type and type ID.
  - A specifies the ECS type.
    - Kunpeng flavor names start with letter k. For example, kc indicates Kunpeng general computing-plus.
  - B specifies the type ID.
- C specifies the flavor size (the number of vCPUs), such as small, medium, large, xlarge, 2xlarge, 4xlarge, and 8xlarge.
- D specifies the ratio of memory to vCPUs and is expressed in a digit. For example, value 4 indicates that the ratio of memory to vCPUs is 4.



# Configuring Network

- Select a VPC, subnet, and security groups for the ECS.

The screenshot shows the AWS ECS Network configuration interface. A large red diagonal watermark "FARHOOD NISHAT" is overlaid across the page.

**Network:** A red box highlights the "Network" section. It shows the selected VPC as "vpc-default(192.168.0.0/16)", the subnet as "subnet-default(192.168.0.0/24)", and the IP assignment as "Automatically assign IP address".

**Extension NIC:** Shows an "Add NIC" button and a message "NICs you can still add: 1".

**Source/Destination Check:** A toggle switch is turned on.

**Security Group:** A red box highlights the "Security Group" section. It shows the selected security group as "Sys-WebServer(e1e04e78-dda1-4276-88d4-e648723165...)" and a "Create Security Group" button.

**Similar to a firewall, a security group logically controls network access.** Ensure that the selected security group allows access to port 22 (SSH-based Linux login), 3389 (Windows login), and ICMP (ping operation).

**Security Group Rules:** A dropdown menu.

**EIP:** A red box highlights the "EIP" section. It shows the EIP type as "Dynamic BGP" (selected) and "Greater than or equal to 99.95% service availability rate" checked.

# Configuring Advanced Settings

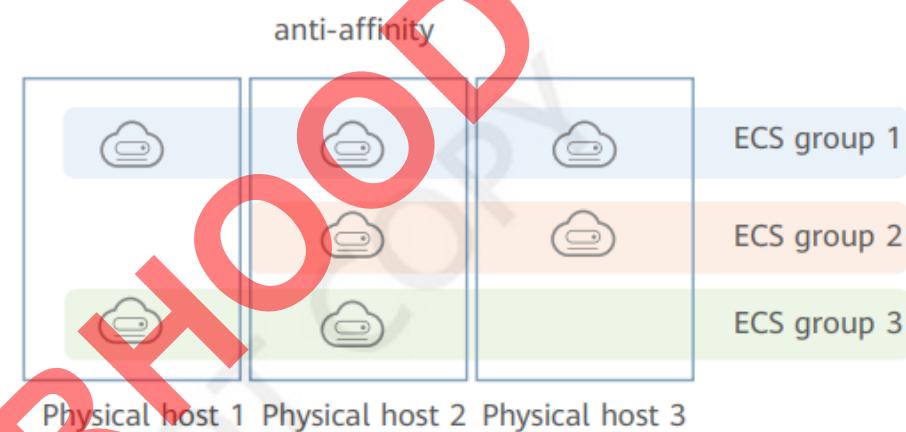
- Set ECS Name, Login Mode, Cloud Backup and Recovery, ECS Group, and Advanced Options.

The screenshot displays the configuration page for creating a new ECS instance. The interface is divided into several sections:

- ECS Name:** The field contains "ecs-dc78".  
A checkbox labeled "Allow duplicate name" is present.
- Login Mode:** The dropdown menu is set to "Password". Other options include "Key pair" and "Set password later".
- Username:** The field contains "root".
- Password:** The field contains "Enter a password." Below it is a placeholder "Enter the password again."
- Cloud Backup and Recovery:** A note states: "To use CBR, you need to purchase a backup vault. A vault is a container that stores backups for servers." Buttons for "Create new", "Use existing", and "Not required" are available.
- ECS Group (Optional):** A dropdown menu is labeled "--Select ECS group--". A "Create ECS Group" button is also present.
- Anti-affinity:** A dropdown menu is labeled "--Select ECS group--".
- Advanced Options:** A checkbox labeled "Configure now" is shown.

## ECS group

- An ECS group allows ECSs within the group to be automatically allocated to different hosts.

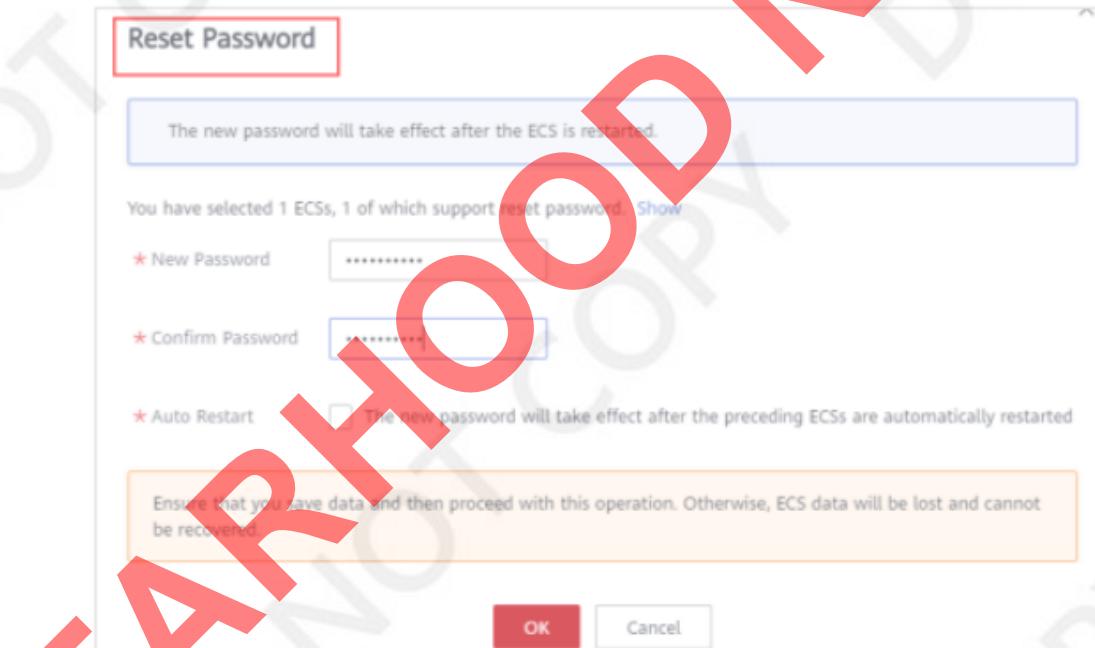


# Modifying ECS Specifications

- If the specifications of an existing ECS cannot meet service requirements, modify the ECS specifications as needed, for example, by increasing the number of vCPUs or adding memory.
- Notes
  - To modify the specifications of a yearly/monthly ECS, select the target specification, pay the difference in price or claim the refund, and restart the ECS.
  - There is no need to make an additional up front payment and there are no refunds if you modify the specifications of a pay-per-use ECS.

# Resetting the ECS Login Password

- Scenarios: The ECS password is lost or has expired.
- Prerequisites: One-click password reset plug-ins have been installed on the ECS.
- Notes: ECSs created using a public image have the one-click password reset plug-in installed by default.



# Contents

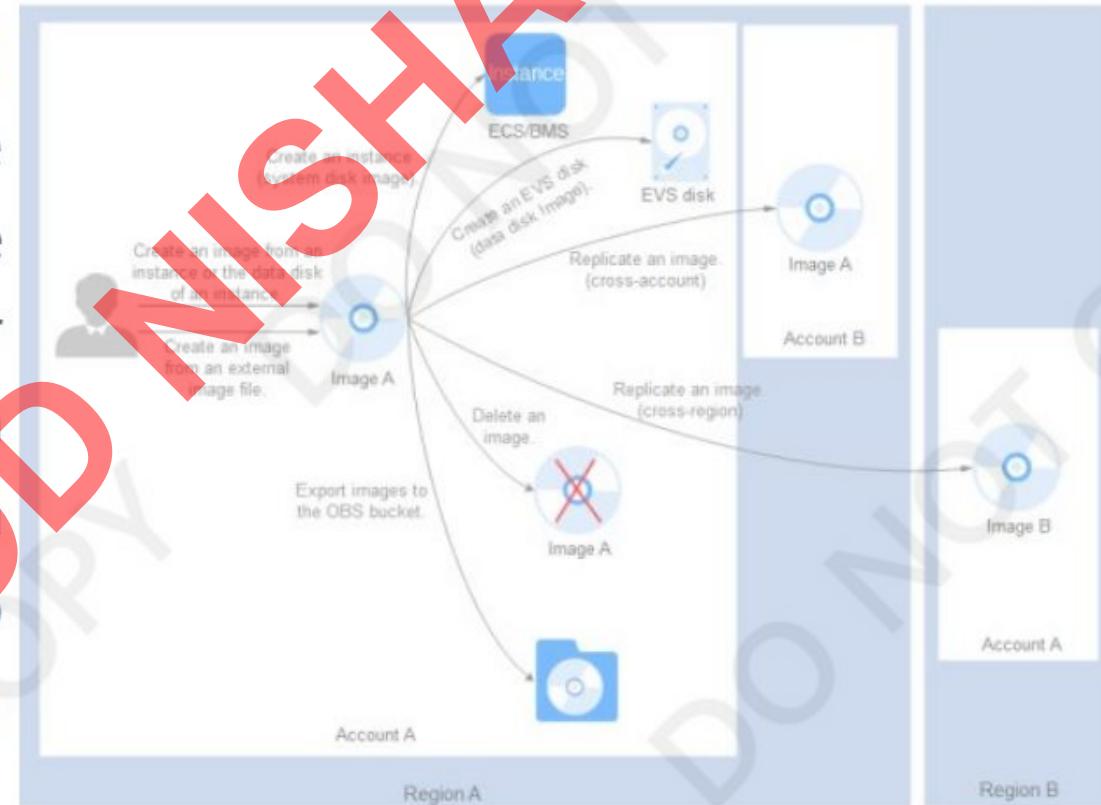
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# What Is IMS?

- Image Management Service (IMS) allows you to manage the entire lifecycle of your images. You can create ECSs or BMSs from public, private, or shared images. You can also create a private image from a cloud server or an external image file to make it easier to migrate workloads to the cloud or on the cloud.



# Why IMS?

## Secure

- Multiple copies of our images ensure high data reliability.

## Unified

- Images can be used to uniformly deploy or upgrade applications, ensuring consistency of your application environments.

## Secure

## Saving Time and Effort

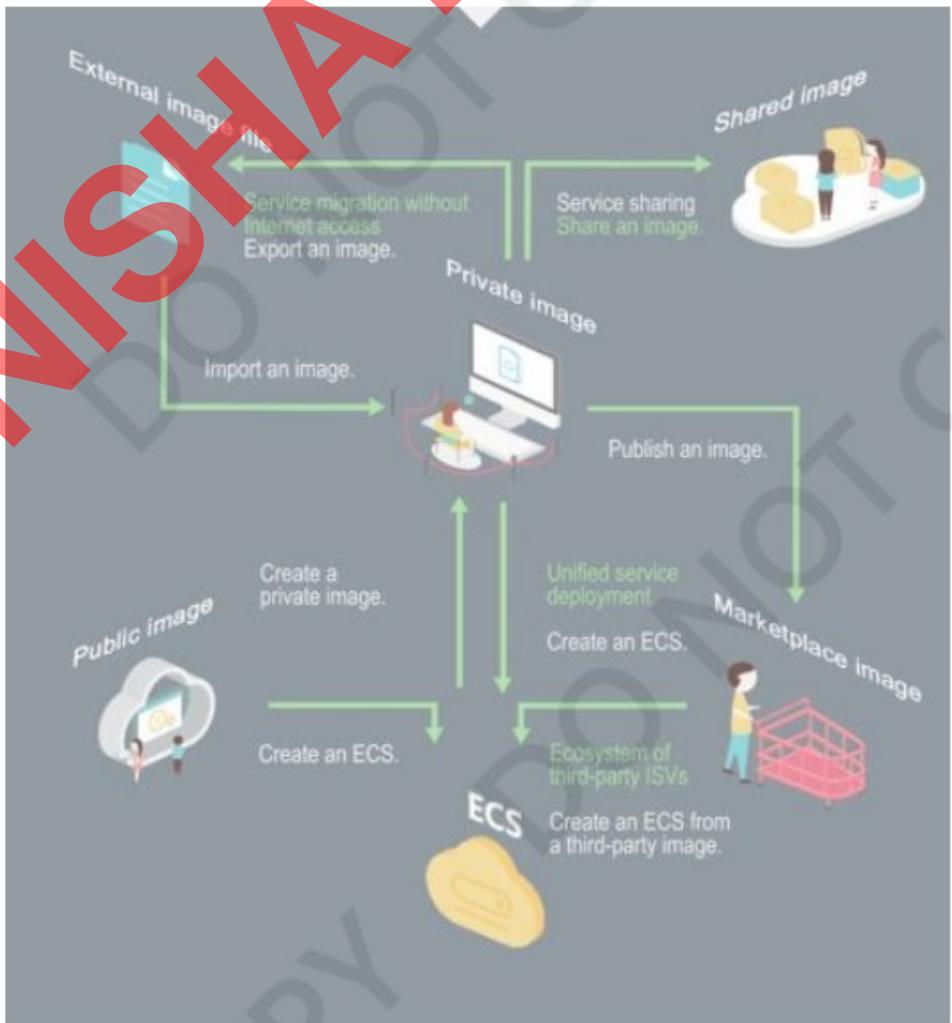
- You can create a private image from an ECS or external image file, also use an existing image to create ECSs.

## Flexible

- Image can be easily managed through the management console or APIs.

# Image Types

- A public image is a standard image provided by the cloud platform. It contains an OS and various preinstalled applications, and is available to all users.
- A private image is created by users and is visible only to the user who created it.
- A shared image is a private image another user has shared with you.
- A Marketplace image is a third-party image published in the Marketplace. It has an OS, various applications, and custom software preinstalled.



# Common IMS Operations

- Modifying an Image
  - You can modify the following information of an image: name, description, minimum memory, maximum memory, NIC multi-queue, and SR-IOV driver.
- Sharing images
  - You can share your images with other tenants. The tenants can use the shared images to quickly create identical ECSs or EVS disks.
- Exporting Images
  - You can export private images to your OBS bucket and download them to your local PC for backup.
  - By exporting an image of a cloud server from the cloud platform, you can reproduce the cloud server and its running environments in on-promises clusters or private clouds. The following figure shows the process of exporting an image.
- image replication
  - In-region replication: This is used for conversion between encrypted and unencrypted images or for enabling advanced features (such as fast ECS creation) for images.
  - Cross-region replication: This is used for replicating a private image in the current region to the same account in another region. You can use this private image to deploy the same application environment in the two regions.

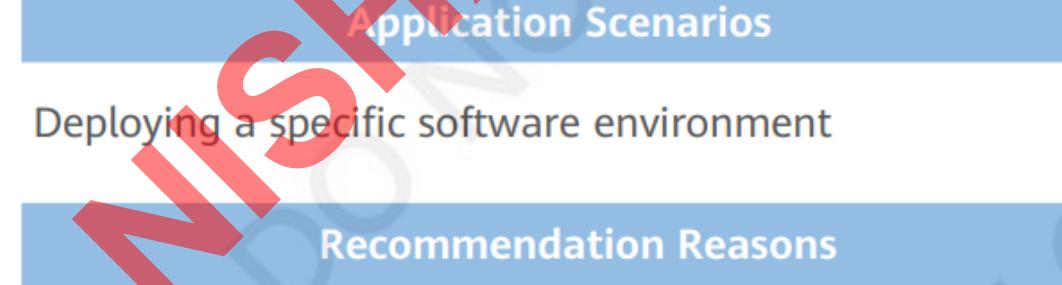
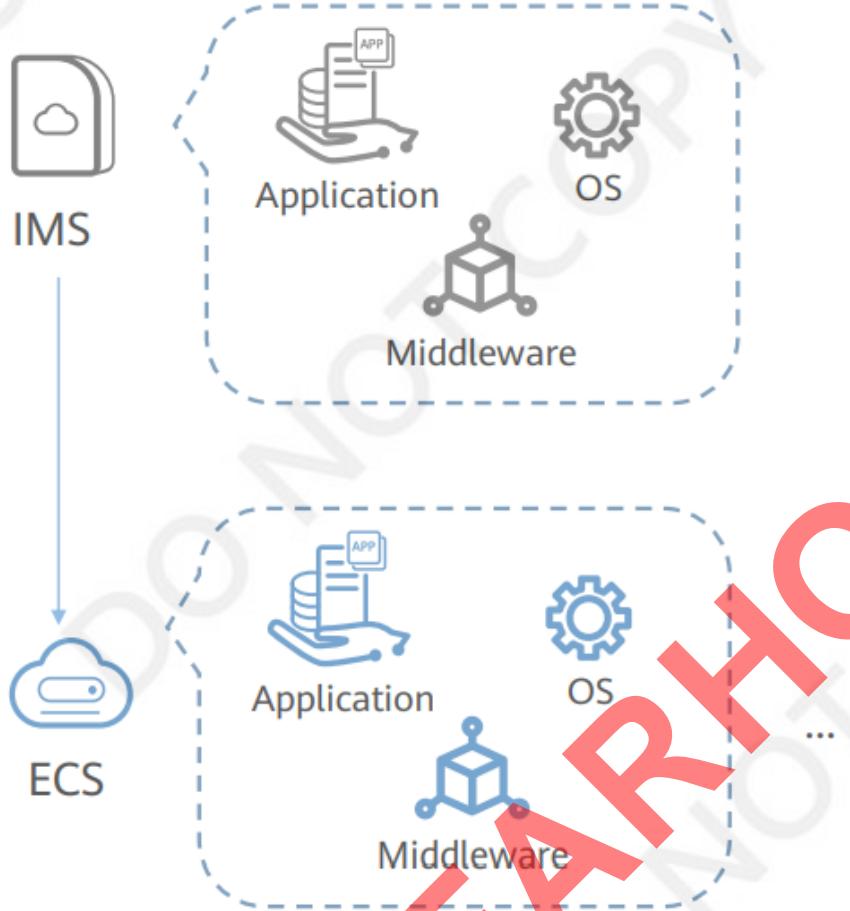
# Scenarios - Migrating Servers to the Cloud or in the Cloud

## Recommendation Reasons

You can import local images to the cloud platform and use the images to quickly create cloud servers for service migration to the cloud. You can also share or replicate images across regions to migrate ECSs between accounts and regions.

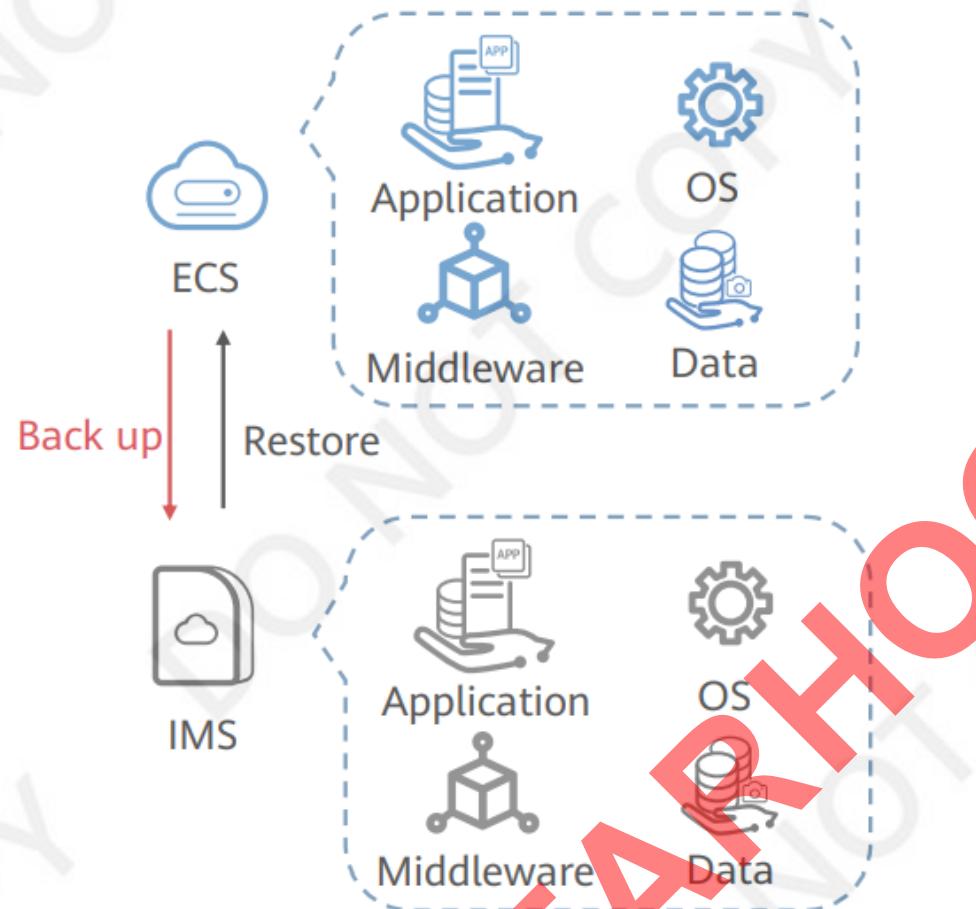


# Scenarios - Deploying a Specific Software Environment



You can use shared or Marketplace images to quickly build custom software environments without having to manually configure environments or install any software. This is especially useful for Internet startups.

# Scenarios - Backing Up Server Environments



## Application Scenarios

Backing up server environments

## Recommendation Reasons

You can create an image from an ECS to back up the ECS. If the ECS breaks down for some reason, you can use the image to restore it.

## Contents

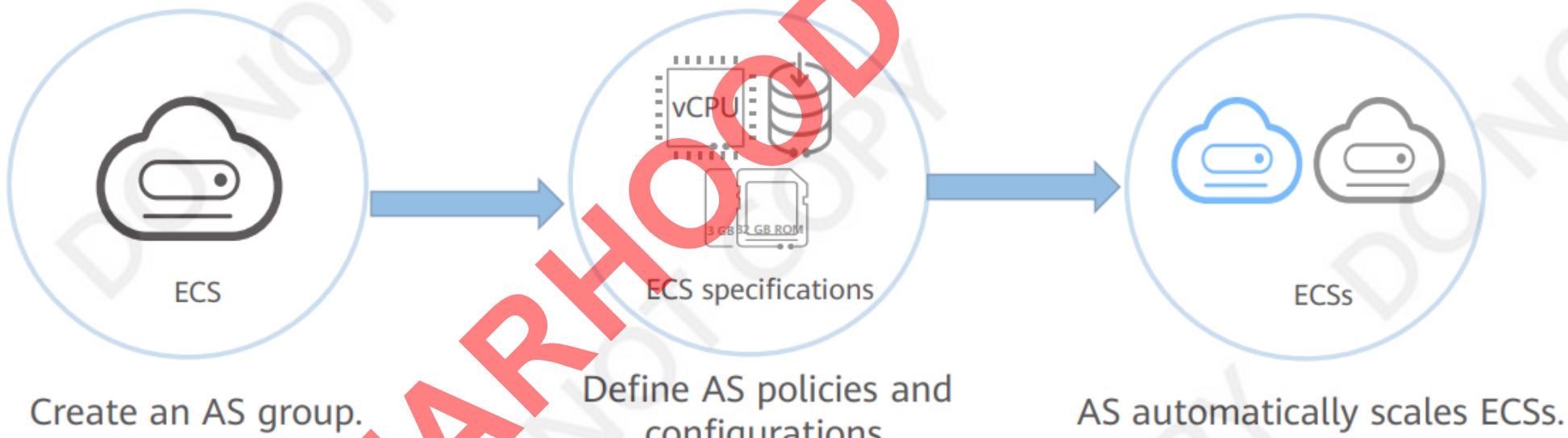
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# What Is AS?

- Auto Scaling (AS) automatically adjusts resources to keep up with changes in demand based on pre-configured AS policies. You can specify AS configurations and policies based on service requirements. These configurations and policies free you from having to repeatedly adjust resources to keep up with service changes and spikes in demand, helping you reduce the resources and manpower required.



# Why AS?

## Automatic resource adjustment

AS automatically adjusts resources on demand for applications.

## High fault tolerance

AS checks ECSs powering applications and replaces faulty instances with new ones.

## Automatic resource Scaling

## High fault tolerance

## Higher Availability

## Enhanced cost management

## Enhanced cost management

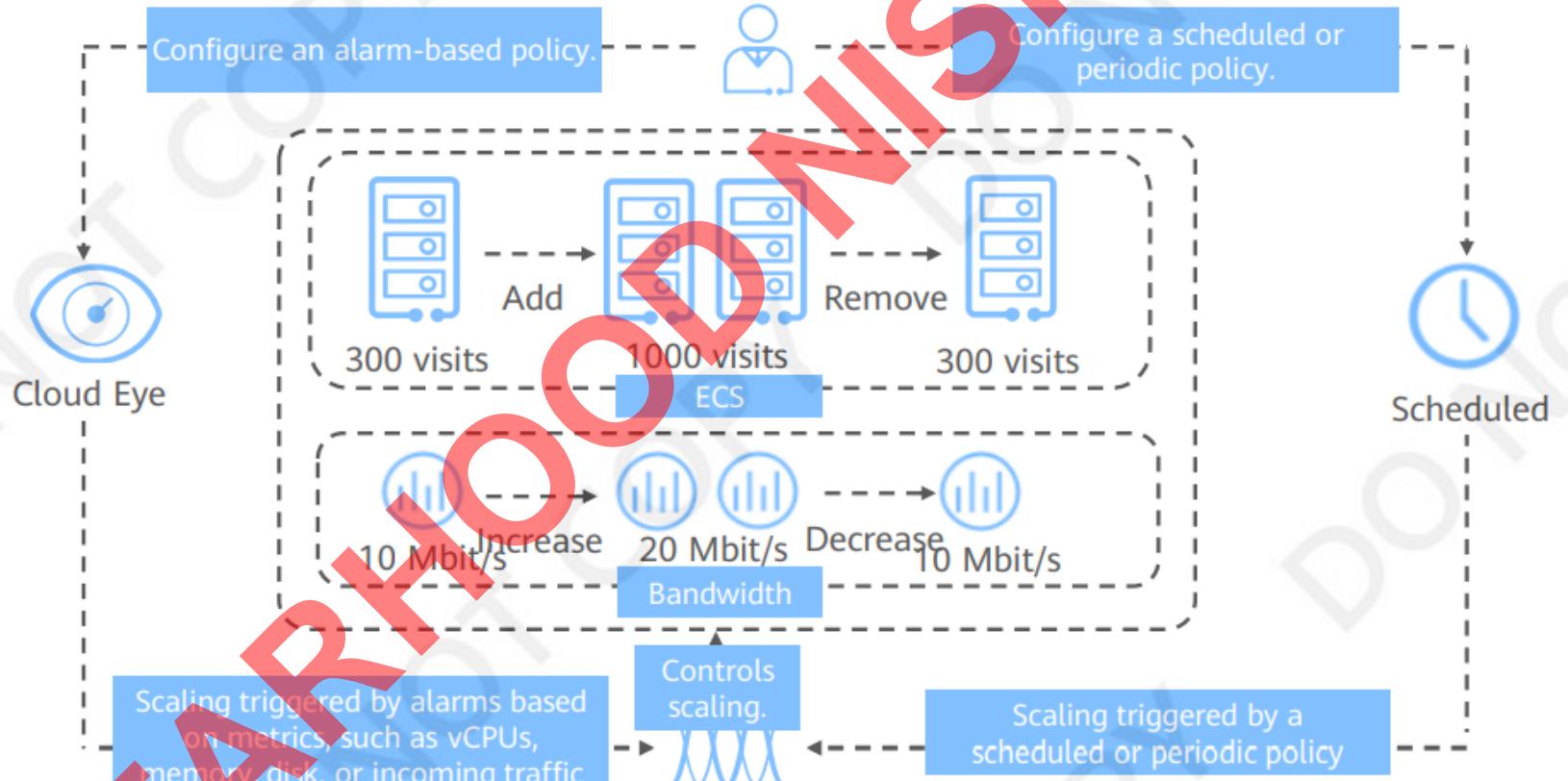
AS adjusts ECS instances and bandwidths on demand, enabling you to pay for what you need.

## Improved availability

AS ensures proper resources deployed for applications.

# AS Architecture

- AS automatically adjusts compute resources based on service demands and configured AS policies. The number of ECS instances changes to match service demands, ensuring service availability.



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# What Is BMS?

- Bare Metal Server (BMS) provides tenants with dedicated servers featuring excellent computing performance equivalent to physical servers as well as high security and reliability. You can obtain BMSs as easily and quickly as ECS and also use the service together with IMS, EVS, and VPC. The BMS service offers both the stability of traditional hosted servers and the high scalability of cloud-based services.



# Why BMS?

## High Security and Reliability

- Dedicated servers, VPC network, and security group
- Server security protection
- Disk backup and restoration
- Dedicated storage

## Quick Provisioning and Unified O&M

- Quick provisioning (can be booted from EVS disks)
- Self-service lifecycle management and O&M

## High performance

- No virtualization overhead or performance loss
- Cloud-based storage and network access
- Deployment density and performance for mission-critical services

## Quick integration

Quick integration with cloud services and cloud solutions for accelerated cloud transformation

High Security and Reliability

High Performance

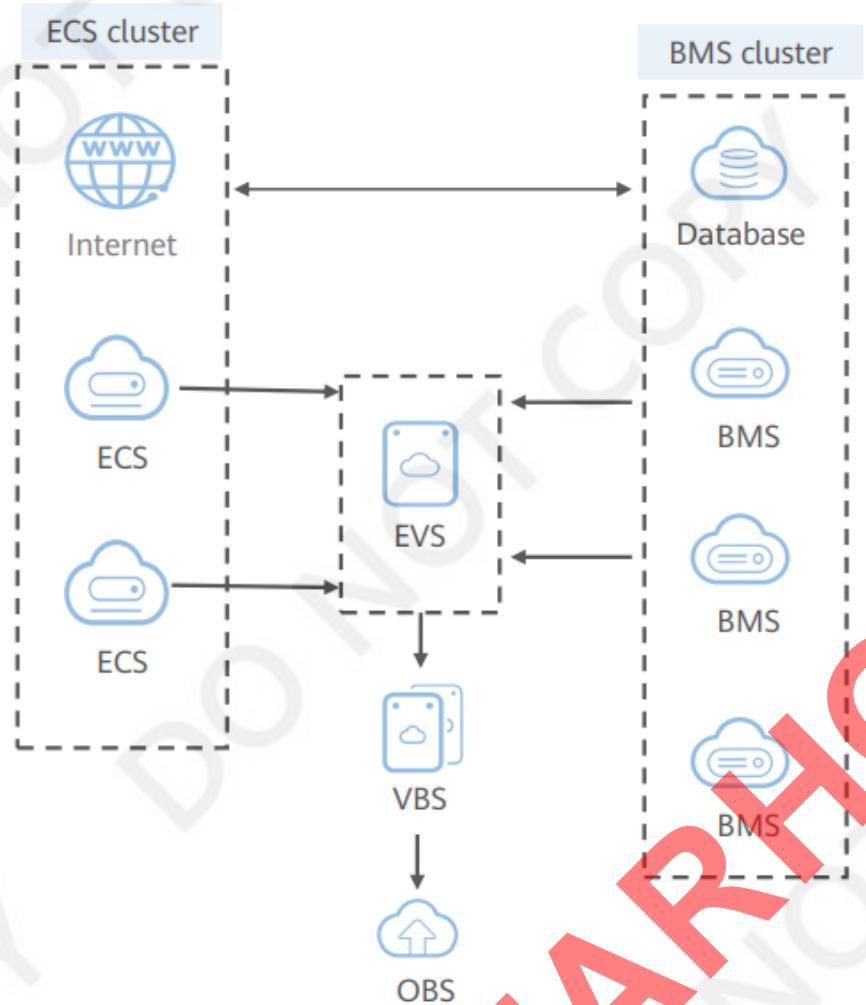
Quick Provisioning and Unified O&M

Quick Integration

# Comparisons Between a BMS, ECS, and Physical Server

Item	BMS	ECS	Physical Server
Physical resources	Exclusive	Shared	Exclusive
Application scenarios	Mission-critical applications or services that require high performance	General-purpose and specific services	Traditional services
Provisioning	Flexible	Flexible	Inflexible
Advanced features	Automatic provisioning, automatic O&M, VPC interconnection, and interconnection with shared storage	Automatic provisioning, automatic O&M, VPC interconnection, and interconnection with shared storage	Traditional features

# Scenarios - Core Database



## Application Scenarios

Core database: Multiple BMS flavors are available and shared EVS disks can be attached to BMSs, providing the performance and security required by core databases.

## Recommendation Reasons

- Requirements: Some critical database services cannot be deployed on VMs and must be deployed on physical servers that have dedicated resources, isolated networks, and assured performance.
- Solution: The BMS service meets these database service requirements by providing high-performance servers dedicated to individual users.

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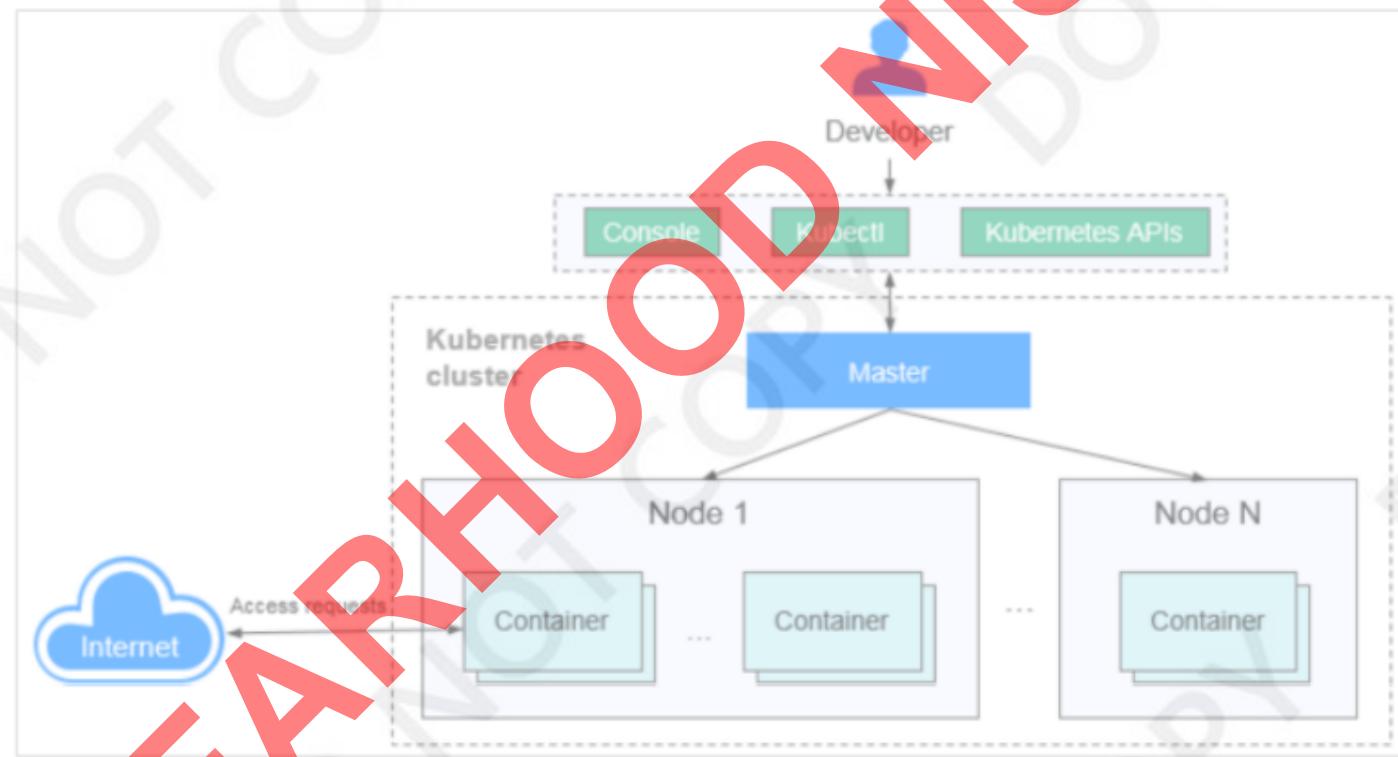
# Container

- Container is a lightweight virtualization technology. It can pack applications and their dependencies together to form an independent running environment, implementing quick deployment and migration of applications.
- The core of the container technology is the namespace and CGroups functions of the Linux kernel. The namespace and CGroups functions can isolate different processes, file systems, networks, and resources, thereby implementing application isolation and secure running.

Features	Container	VM
Start Time	Second-level	Minute-level
Virtualization Type	Operating system virtualization	Hardware-based virtualization
OS Dependency	All containers share the host OS.	Each VM runs in its own OS
Isolation Policy	Namespace, CGroups	Hypervisor
Mirror Size	KB - MB	GB - TB

# What Is CCE?

- Cloud Container Engine (CCE) is a highly scalable, high-performance, enterprise-class Kubernetes service for you to run containers and applications. With CCE, you can easily deploy, manage, and scale containerized applications on HUAWEI CLOUD.



# Why CCE?

## Easy to Use

- Create Kubernetes clusters in a few clicks on the console.
- Scale clusters and workloads on the console.
- Upgrade Kubernetes clusters on the console.
- Experience out-of-the box usability.
- Enjoy auto deployment and O&M of containerized applications.

## High-performance

- Bare-metal servers with NUMA and high-speed InfiniBand NICs
- Industry-leading container engine

Easy to Use

High-performance

Highly Available and Secure

Open and compatible

## Open and compatible

- Fully compatible with Kubernetes APIs and kubectl
- Easy management of large-scale container clusters

## Highly Available and Secure

- You can deploy 3 master nodes on the cluster control plane for high availability (HA).
- Users have complete control of clusters they create.

# CCE Architecture



# Basic Concepts

Cluster

- A cluster is a collection of cloud resources required for running containers, such as cloud servers and load balancers.

Pod

- A pod consists of one or more related containers that share the same storage and network space.

Node

- A node is a server (a VM or PM) on which containerized applications run.

Service

- A container is a running instance of a Docker image. Multiple containers can run on the same node.

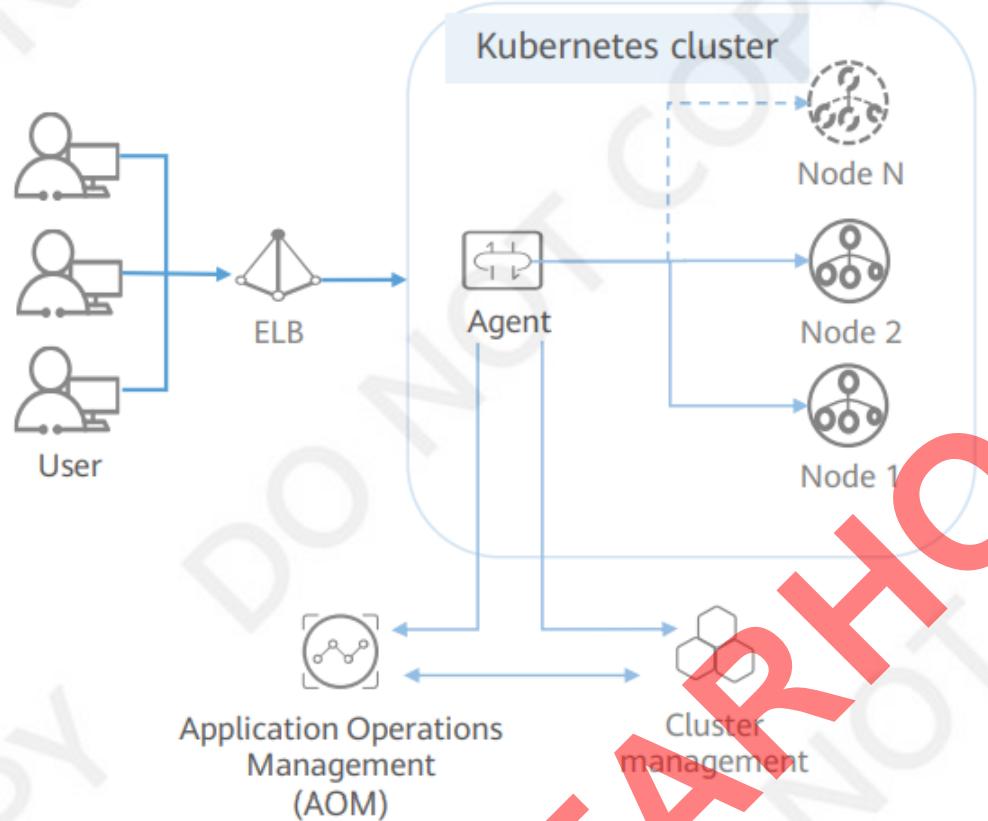
Container

- A container is a running instance of a Docker image. Multiple containers can run on the same node.

Image

- An image is a binary that includes all of the requirements for running a container.

# Scenario - Auto Scaling in Second



## Function Description

CCE adjusts compute resources based on auto scaling policies to handle fluctuating service loads. Specifically, CCE automatically adds or reduces cloud servers for your cluster or containers for your workload.

## Benefits

- Flexible: Multiple scaling policies are supported and containers can be provisioned within seconds when specific conditions are met.
- Highly available: Pods are automatically monitored and unhealthy pods will be replaced with new ones to ensure high service availability.
- Low cost: You are billed only for the cloud servers you use.

# Contents

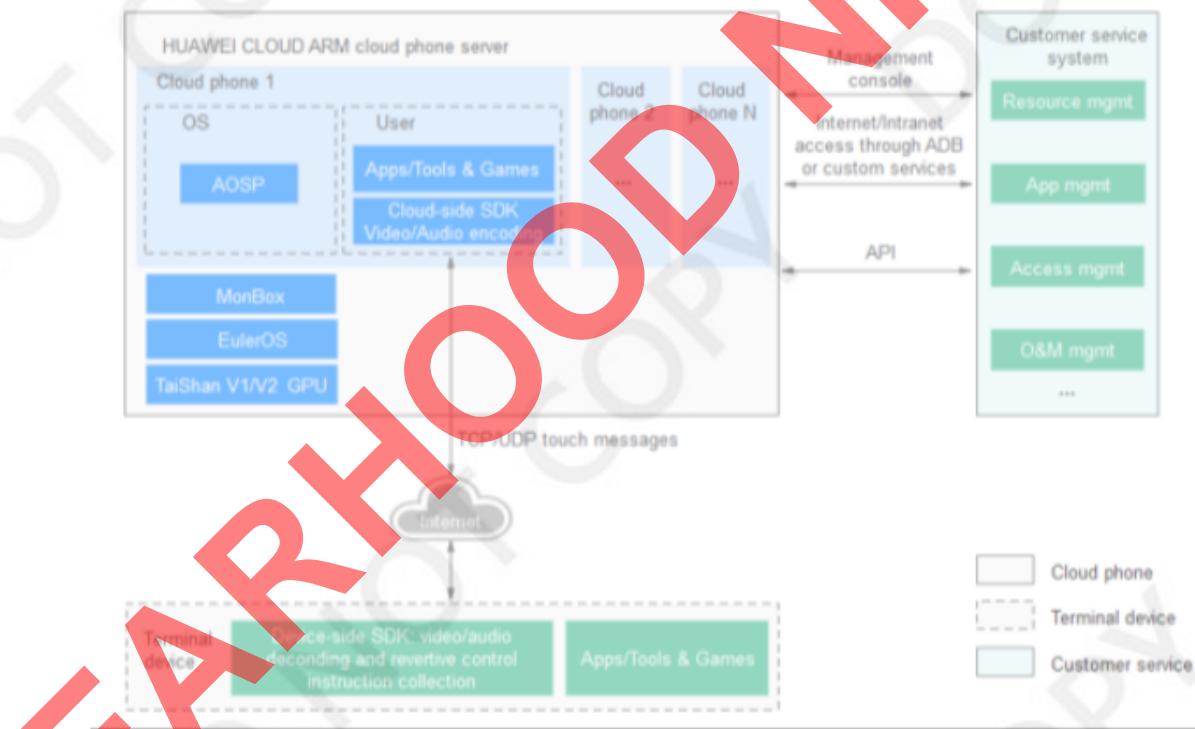
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1. Elastic Cloud Server (ECS)
2. Image Management Service (IMS)
3. Auto Scaling (AS)
4. Bare Metal Server (BMS)
5. Cloud Container Engine (CCE)
6. Other Compute Services

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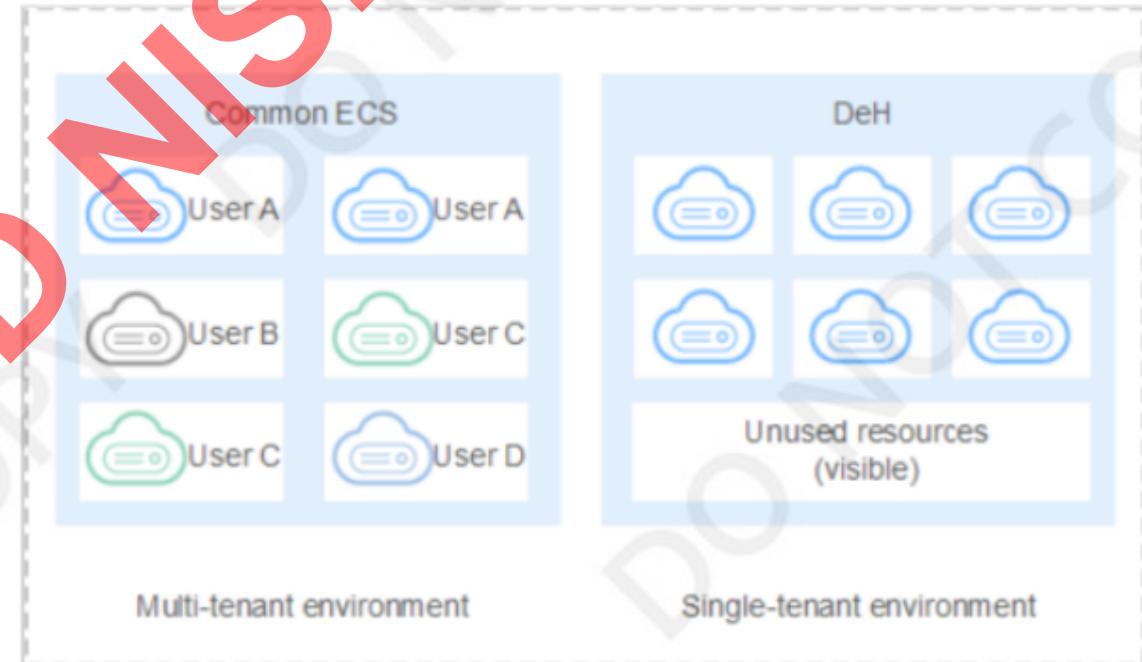
# Cloud Phone Service (CPH)

- Cloud Phone Host (CPH) provides you with cloud servers virtualized from Huawei Cloud BMSs and running native Android. Just one of these cloud servers can virtualize up to 60 cloud phones with the functions of virtual phones. You can remotely control cloud phones in real time and run Android applications on the cloud. Cloud phone compute lets you build and test phone applications more efficiently.



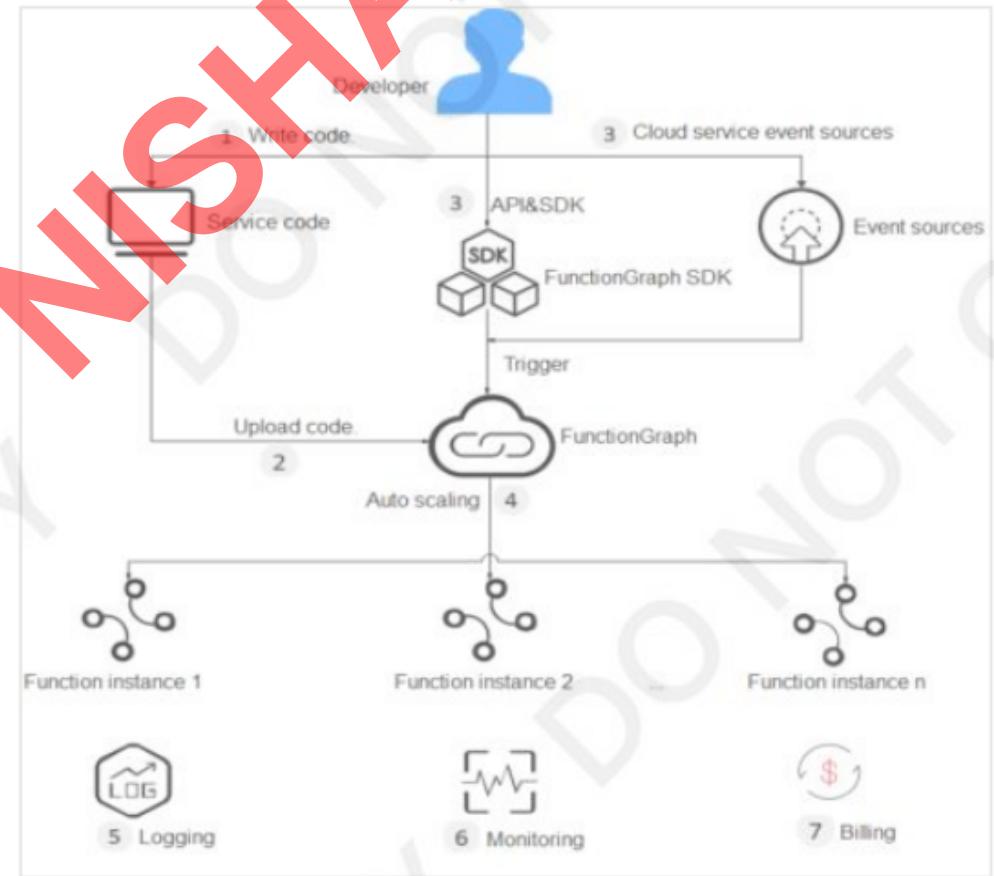
# What Is DeH?

- Dedicated Host (DeH) provides dedicated physical hosts to ensure isolation, security, and performance for your ECSs. You can bring your own license (BYOL) to DeH to reduce the costs on software licenses and facilitate the independent management of ECSs..



# What Is FunctionGraph?

- FunctionGraph allows you to run your code without provisioning or managing servers, while ensuring high availability and scalability. All you need to do is upload your code and set execution conditions, and FunctionGraph will take care of the rest. You pay only for what you use and you are not charged when your code is not running.



# Storage Cloud Services

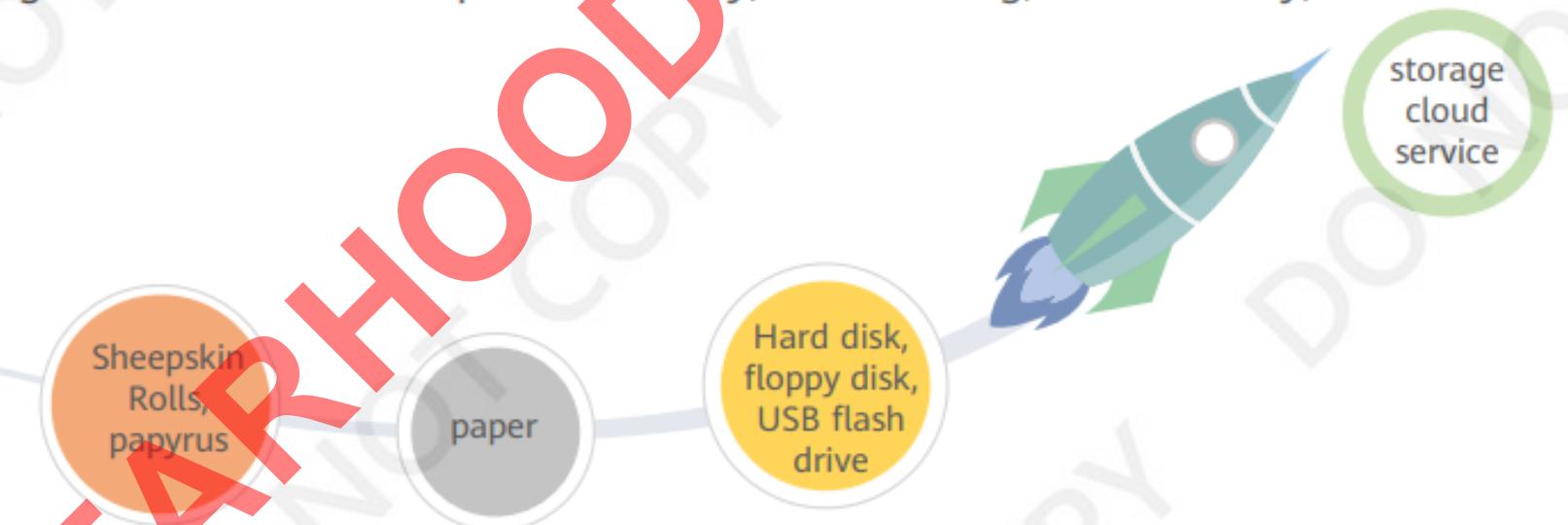


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# What is a storage cloud service?

- Storage refers to the process of storing data or information in a computer or other electronic device. Storage can be temporary or long-term, such as keeping files on hard drives or cloud storage.
- Storage Services is a service that stores data on the Internet. It allows users to upload data to remote servers over the Internet, and access and manage that data anytime, anywhere. Cloud storage is usually provided by cloud service providers and can be used by users through subscription services. The benefits of cloud storage include data backup and recovery, data sharing, data security, and reliability.

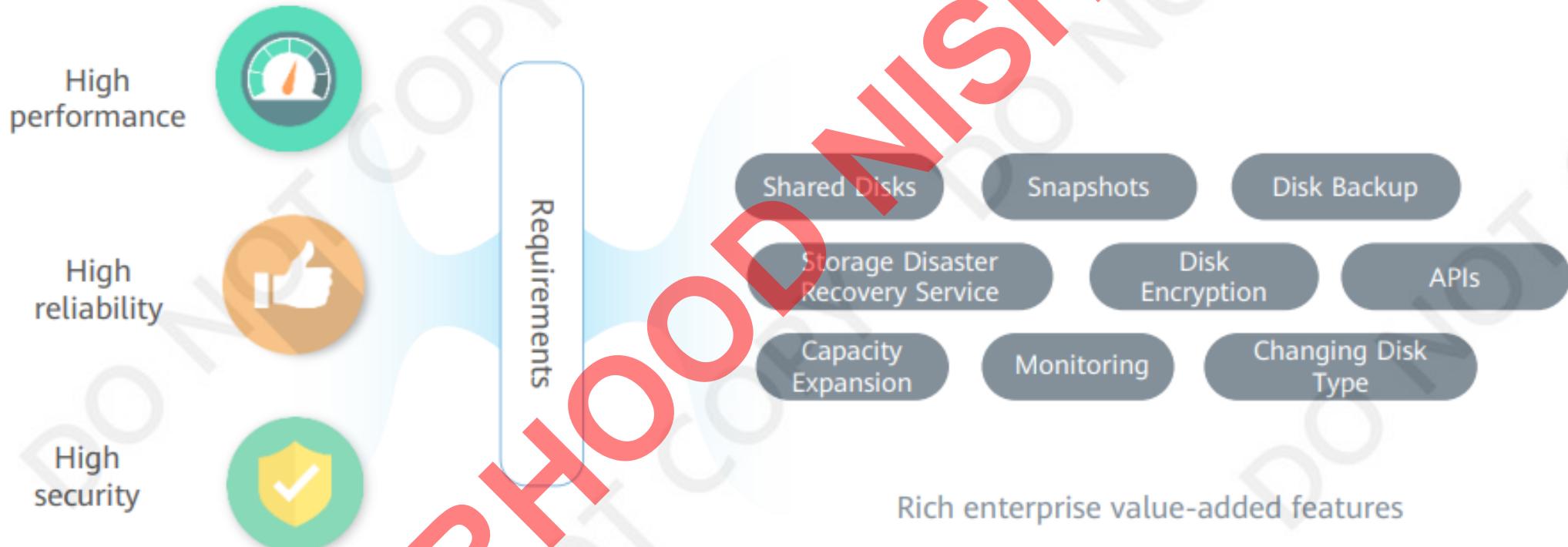


# Contents

1. Elastic Volume Service
2. Object Storage Service
3. Scalable File Service
4. Cloud Backup and Recovery Service

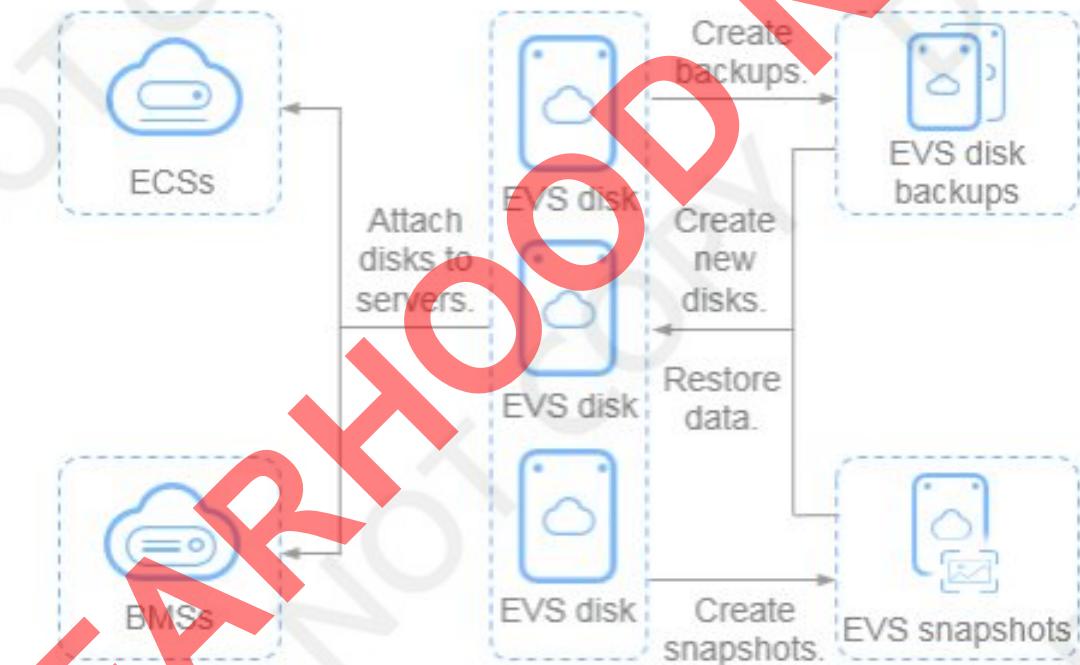
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# Enterprise requirements for block storage



# What Is EVS

- Elastic Volume Service (EVS) offers scalable block storage for cloud servers. With high reliability, high performance, and a variety of specifications, EVS disks can be used for distributed file systems, development and test environments, data warehouses, and high-performance computing (HPC) applications. Cloud servers that EVS supports include Elastic Cloud Servers (ECSs) and Bare Metal Servers (BMSs).



# Disk Types and Performance

Metric	Extreme SSD	General Purpose SSD V2	Ultra-high I/O	General Purpose SSD	High I/O
Max. capacity (GiB)	System disk: 1,024 Data disk: 32,768				
Max. IOPS (reference)	128000	128,000	50,000	20000	5000
Max. Throughput (reference)	1000 MiB/s	1,000 MiB/s	350 MiB/s	250 MiB/s	150 MiB/s
Single-queue access latency (reference)	Sub-millisecond	1 ms	1 ms	1 ms	1 ms ~ 3 ms
Typical workloads	Database workloads Oracle, SQL Server, ClickHouse, AI workloads	Enterprise OA and virtual desktops, Large-scale development and testing, Transcoding services, System disks	Transcoding services, I/O-intensive workloads NoSQL, Oracle, SQL Server, PostgreSQL	Enterprise OA, Medium-scale development and test environments, Small-and medium-sized databases, Web applications, System disks	Common development and test environments

IOPS

Number of read/write operations performed by an EVS disk per second.

Throughput

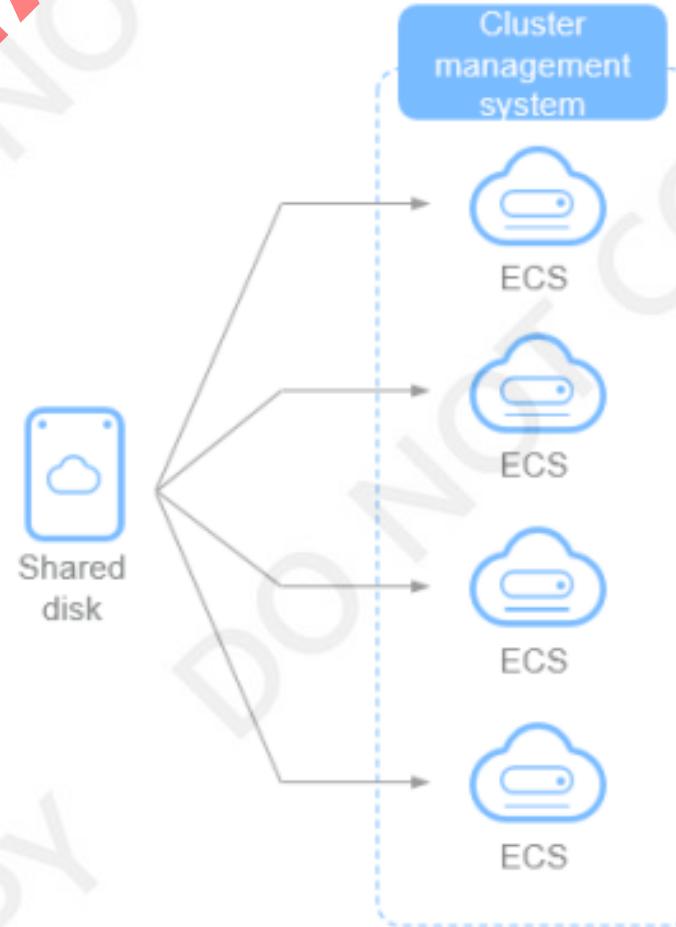
Amount of data read from and written into an EVS disk per second.

Read/write I/O latency

Minimum interval between two consecutive read/write operations on an EVS disk

# Shared EVS Disks

- Shared EVS disks are block storage devices that support concurrent read/write operations and can be attached to multiple servers. Shared EVS disks feature multiple attachments, high-concurrency, high-performance, and high-reliability. They are usually used for enterprise business-critical applications that require cluster deployment for high availability (HA). Multiple servers can access the same shared EVS disk at the same time.
- You can create shared EVS disks with device type VBD and SCSI.



## Contents

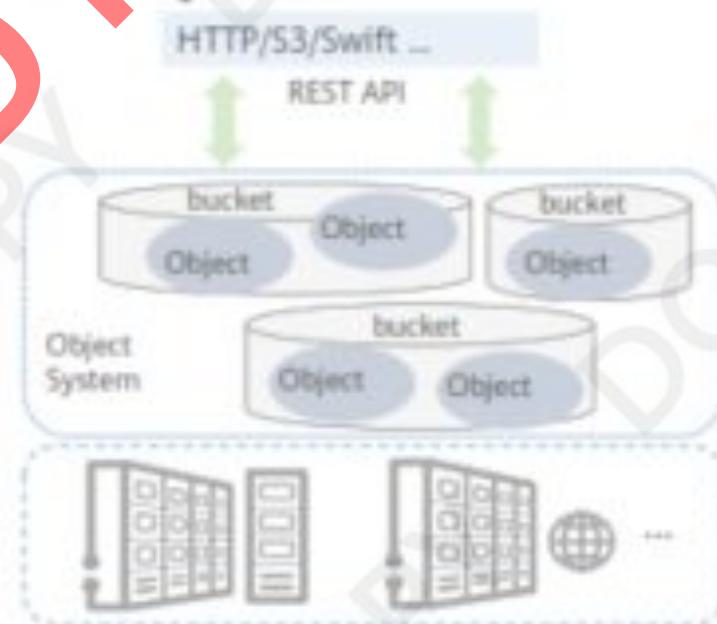
1. Elastic Volume Service
2. **Object Storage Service**
3. Scalable File Service
4. Cloud Backup and Recovery Service

## What Is Object storage

- OBS is an object-based massive storage service. It provides data storage capabilities that are easy to expand, secure, reliable, and cost-effective.
- OBS is a service oriented to Internet access. It provides HTTP/HTTPS-based web service interfaces for users to access the Internet anytime and anywhere.

Features:

- Flattened structure and data isolation between tenants
- Users can create buckets (like folders), upload or download objects, and share data by forwarding links.



# Storage Classes

- OBS offers the storage classes below to meet your requirements for storage performance and cost:
  - Standard: The Standard storage class features low latency and high throughput. It is therefore good for storing frequently (multiple times per month) accessed files or small files (less than 1 MB). Its application scenarios include big data analytics, mobile apps, hot videos, and social apps.
  - Infrequent Access: The Infrequent Access storage class is for storing data that is infrequently (less than 12 times per year) accessed, but when needed, the access has to be fast. It can be used for file synchronization, file sharing and many other scenarios. This storage class has the same durability, low latency, and high throughput as the Standard storage class, with a lower cost, but its availability is slightly lower than the Standard storage class.
  - Archive: The Archive storage class is ideal for storing data that is rarely (once per year) accessed. Its application scenarios include data archive and long-term backups. This storage class is secure, durable, and inexpensive, so it can be used to replace tape libraries. To keep cost low, it may take hours to restore data from the Archive storage class



## Versioning

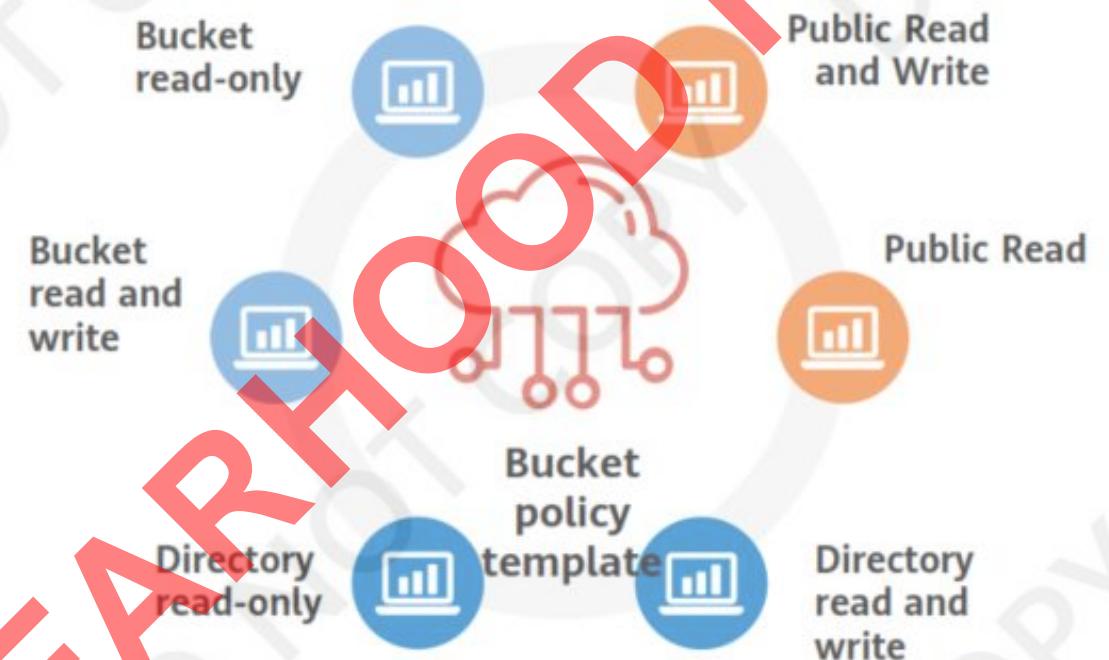
- OBS can store multiple versions of an object. You can quickly search for and restore different versions or restore data in the event of accidental deletions or application faults.
- By default, versioning is disabled for new OBS buckets. New objects will overwrite existing objects in case they have the same names.



With versioning enabled, OBS automatically allocates a unique version ID to a newly uploaded object. When an object with the same name as an existing object is uploaded again, both objects are stored in OBS with the same name but different version IDs.

# Bucket policies

- A bucket owner can configure a bucket policy to manage access to the bucket.
- Bucket policies centrally control access to buckets and objects based on a variety of request elements, such as actions, principals, resources, and others (like IP addresses).



## Contents

1. Elastic Volume Service
2. Object Storage Service
- 3. Scalable File Service**
4. Cloud Backup and Recovery Service

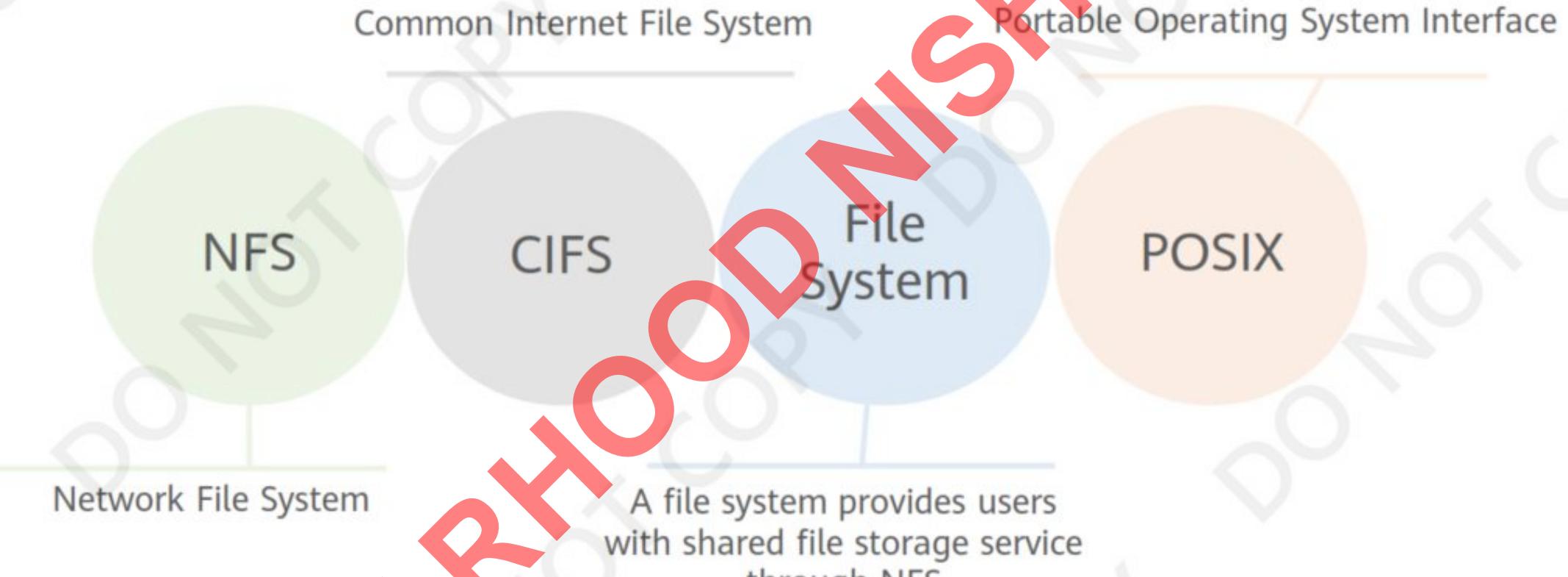
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## What Is SFS

- Scalable File Service (SFS) provides scalable, high-performance (NAS) file storage. With SFS, you can enjoy shared file access spanning multiple Elastic Cloud Servers (ECSs), Bare Metal Servers (BMSs), and containers created on Cloud Container Engine (CCE).
- You can access SFS on the management console or via APIs by sending HTTPS requests.



# SFS Basic Concepts



A file system provides users with shared file storage service through NFS

# SFS functions



- Compatible with NFSv3, SFS meets your demands in various system environments.



- Storage can be scaled up or down on demand to dynamically adapt to service changes without interrupting application services.



- ECS instances can access file shares among AZs within the same region.



- A file system can be exclusively shared by ECSs within a designated VPC.

## Scenario - File Sharing

- SFS applies to scenarios where there are a large number of departments or employees in an enterprise and the same documents need to be shared and accessed. The enterprise file storage hosted by SFS provides multiple file storage services, featuring high reliability, low latency, and high bandwidth. Users do not need to care about the underlying hardware infrastructure, avoiding the complexity of hardware deployment and maintenance.



# SFS vs OBS vs EVS

Dimension	SFS	OBS	EVS
Concept	SFS provides on-demand high-performance file storage, which can be shared by multiple ECSs	OBS provides massive, secure, reliable, and cost-effective data storage for users to store data of any type and size	EVS provides scalable block storage that features high reliability and high performance to meet various service requirements.
Data storage logic	Stores files. Data is sorted and displayed in files and folders	Stores objects. Files can be stored directly to OBS. The files automatically generate corresponding system metadata	Stores binary data and cannot directly store files. To store files, you need to format the file system first
Access method	SFS file systems can be accessed only after being mounted to ECSs or BMSs through NFS or CIFS	OBS buckets can be accessed through the Internet or Direct Connect. transmission protocols HTTP and HTTPS are used	EVS disks can be used and accessed from applications only after being attached to ECSs or BMSs and initialized
Capacity	PB-scale	EB-scale	TB-scale
Latency	3~10 ms	10 ms	Sub-millisecond level
Bandwidth	GB/s	TB/s	MB/s
Application Scenario	Gene sequencing, image rendering, media processing, file sharing, content management, and web services	Big data analysis, static website hosting, online video on demand (VoD), gene sequencing, and intelligent video surveillance	Industrial design, energy exploration, critical clustered applications, enterprise application systems, and development and testing

## Contents

1. Elastic Volume Service
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4. **Cloud Backup and Recovery Service**

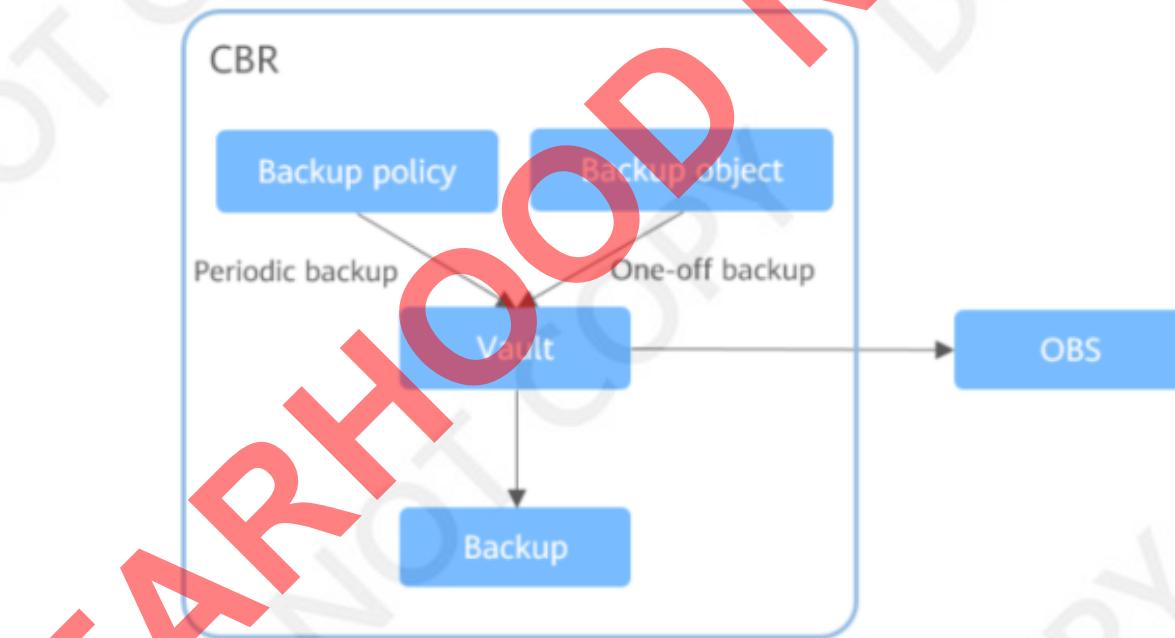
# What Is CBR

- Cloud Backup and Recovery (CBR) enables you to easily back up Elastic Cloud Servers (ECSs), Bare Metal Servers (BMSs), Elastic Volume Service (EVS) disks, SFS Turbo file systems, local files and directories, and on-premises VMware virtual environments.
- In case of a virus attack, accidental deletion, or software or hardware fault, you can use the backup to restore data to any point when the data was backed up.



# Backup Options

- CBR supports one-off backup and periodic backup.
  - A one-off backup task is manually created and is executed only once.
  - Periodic backup tasks are automatically executed based on a user-defined backup policy.



# Scenarios: Data Backup and Restoration

- You can use CBR to quickly restore data to the latest backup point if any of the following incidents occur:
  - Hacker or virus attacks
  - Accidental deletion
  - Application update errors
  - System breakdown



# Cloud Network Services

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## Contents

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1. Virtual Private Cloud (VPC)
2. Elastic IP (EIP)
3. Elastic Load Balance (ELB)
4. Virtual Private Network (VPN)
5. NAT Gateway
6. Other Services

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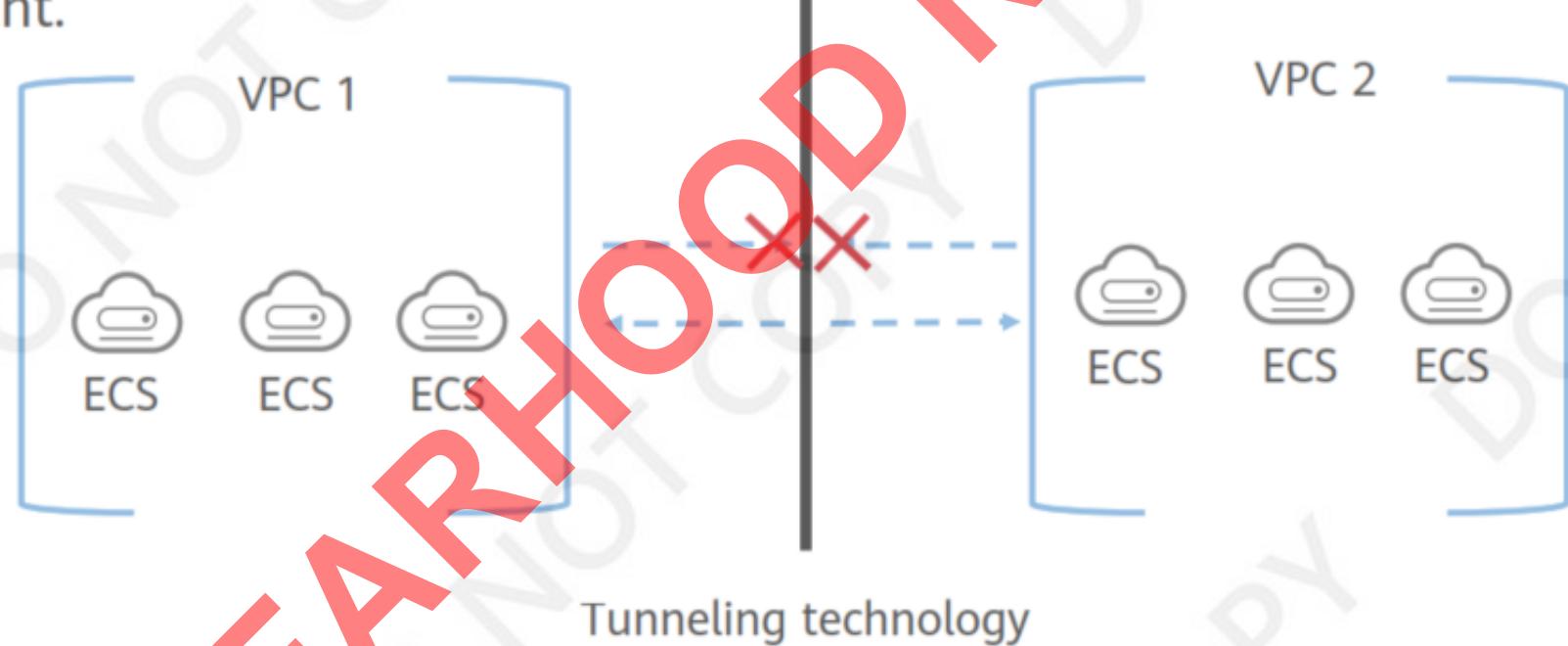
# Network Services

- A network is a system that connects multiple computers or other devices together so that they can communicate and share resources with each other. A network can be a different type, such as a local area network (LAN), a wide area network (WAN), or the Internet.
- Huawei Cloud provides various network services to help you build secure and scalable networks on the cloud, connect cloud and on-premises networks in a high-speed and reliable way, and connect your on-premises data center to the Internet.



# What Is a VPC?

- The Virtual Private Cloud (VPC) service enables you to provision logically isolated, configurable, and manageable virtual networks for cloud servers, cloud containers, and cloud databases, improving cloud service security and simplifying network deployment.



# VPC Advantages

## Seamless Interconnectivity

- Multiple methods for connecting to the Internet
- A VPC peering connection enables two VPCs to communicate with each other using private IP addresses.

## Secure and Reliable

- 100% logical isolation
- Comprehensive security

Seamless  
Interconnectivity

Secure and  
Reliable

High-Speed  
Access

Flexible  
Configuration

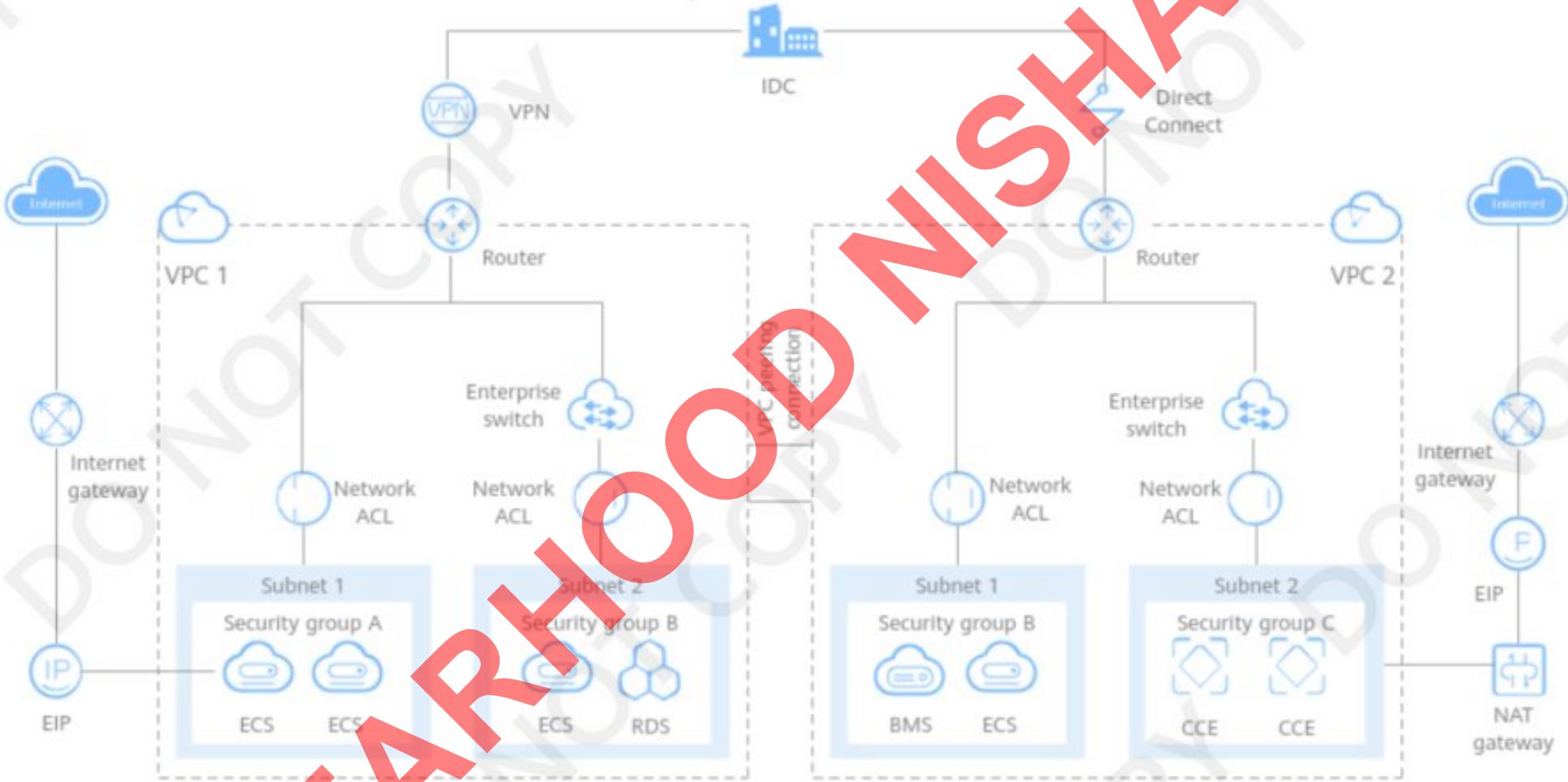
## High-Speed Access

- Dynamic BGP access to multiple carriers
- Automatic failover in real time

## Flexible Configuration

- User-defined network
- ECSs can be deployed across AZs.

# VPC Architecture



# VPC Components

- Each VPC consists of a private CIDR block, route tables, and at least one subnet.

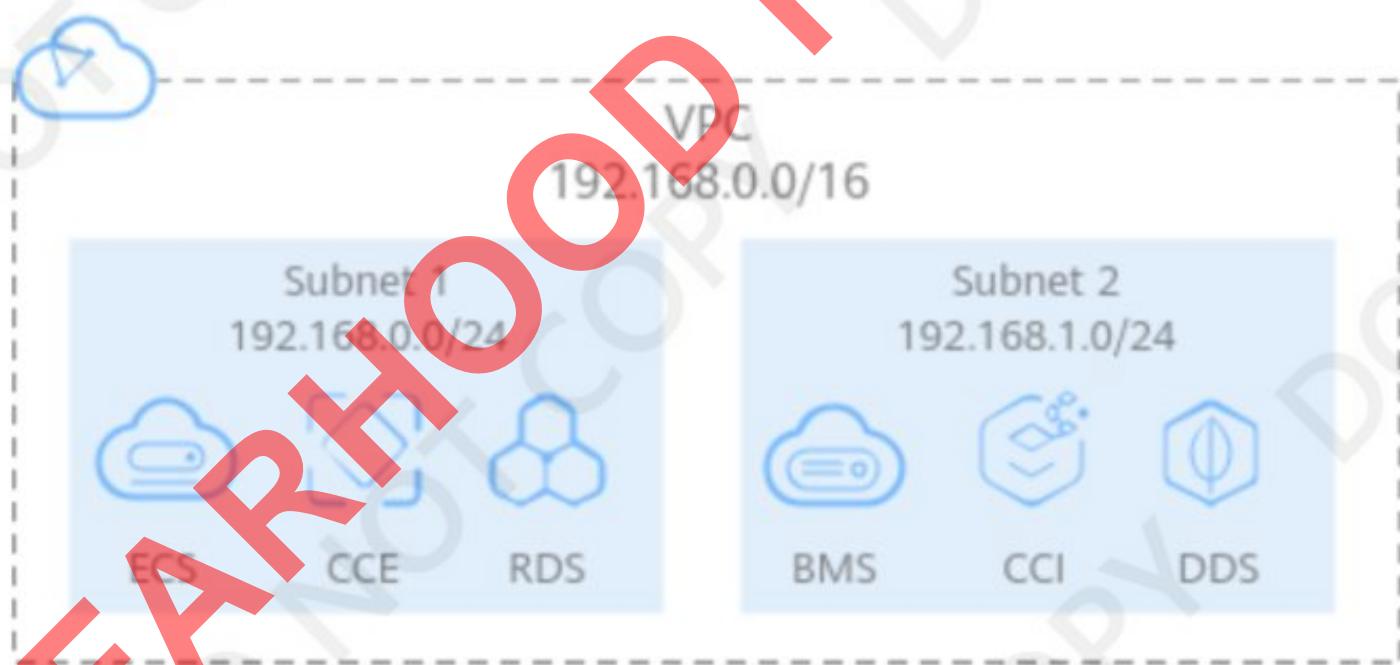


# VPC Concepts



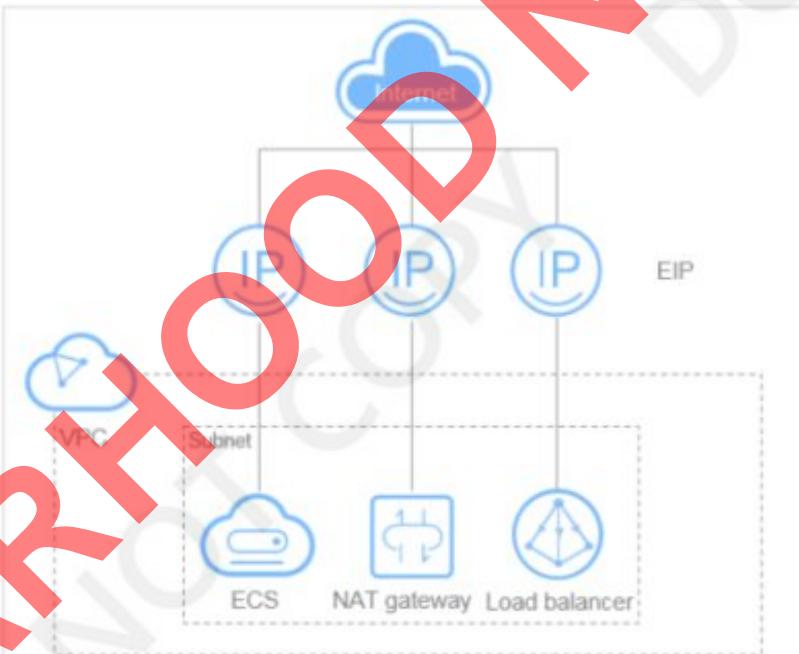
## Subnet

- A subnet is a unique CIDR block, a range of IP addresses, in your VPC.
- All resources in a VPC must be deployed on subnets.
- Once a subnet has been created, its CIDR block cannot be modified.



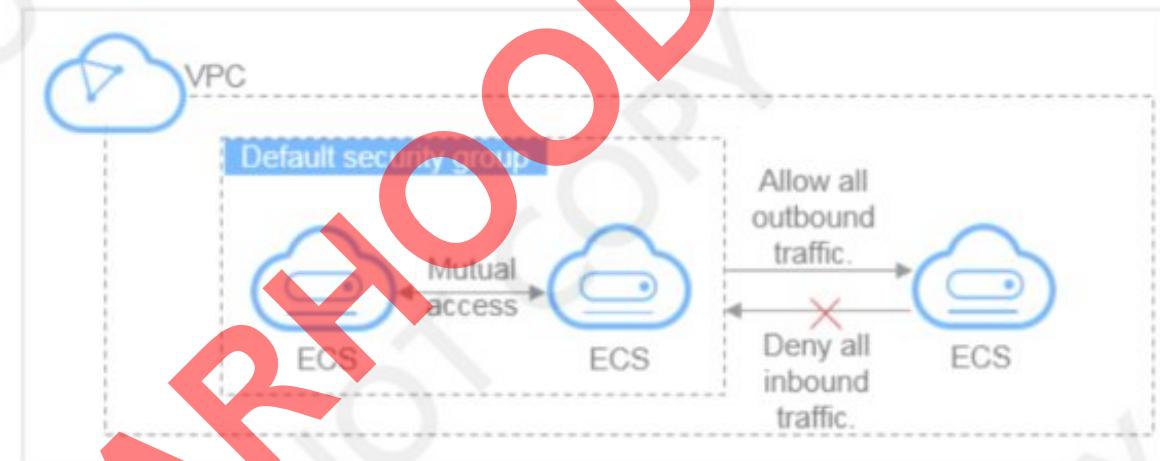
## Elastic IP

- The Elastic IP (EIP) service enables your cloud resources to communicate with the Internet using static public IP addresses and scalable bandwidths. EIPs can be bound to or unbound from ECSs, BMSs, virtual IP addresses, NAT gateways, or load balancers.



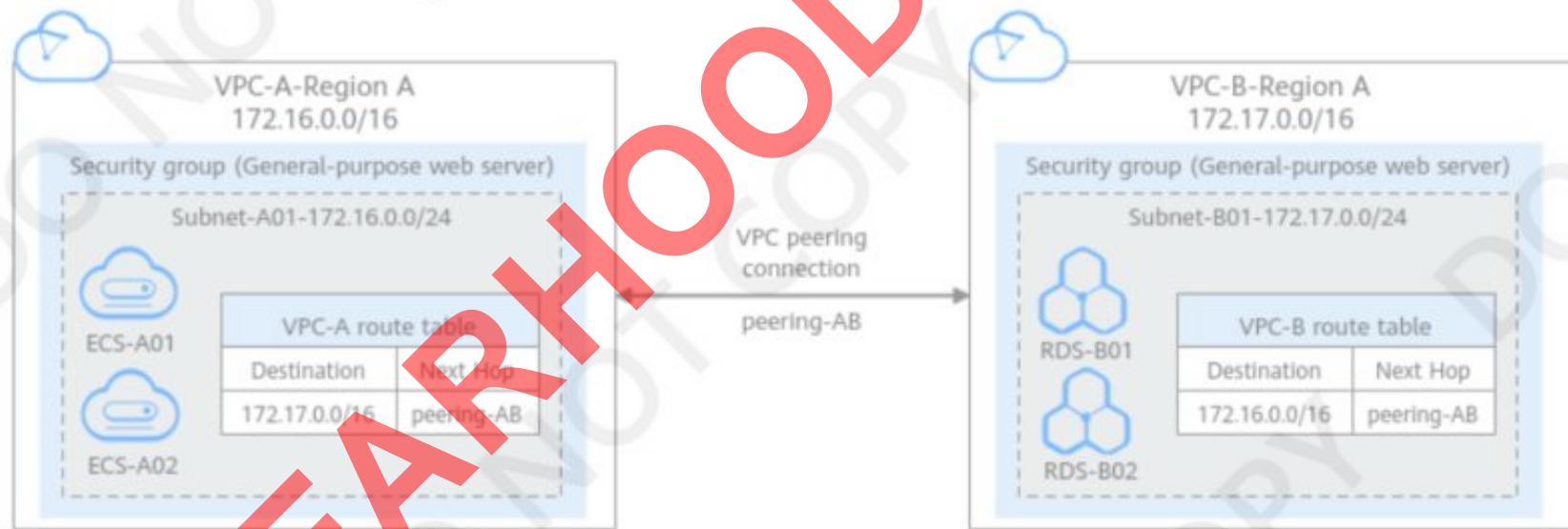
# Security Group

- A security group is a collection of access control rules for ECSs that have the same security requirements and are mutually trusted within a VPC. After you create a security group, you can create different access rules for the security group, and the rules will apply to any ECS that the security group contains.



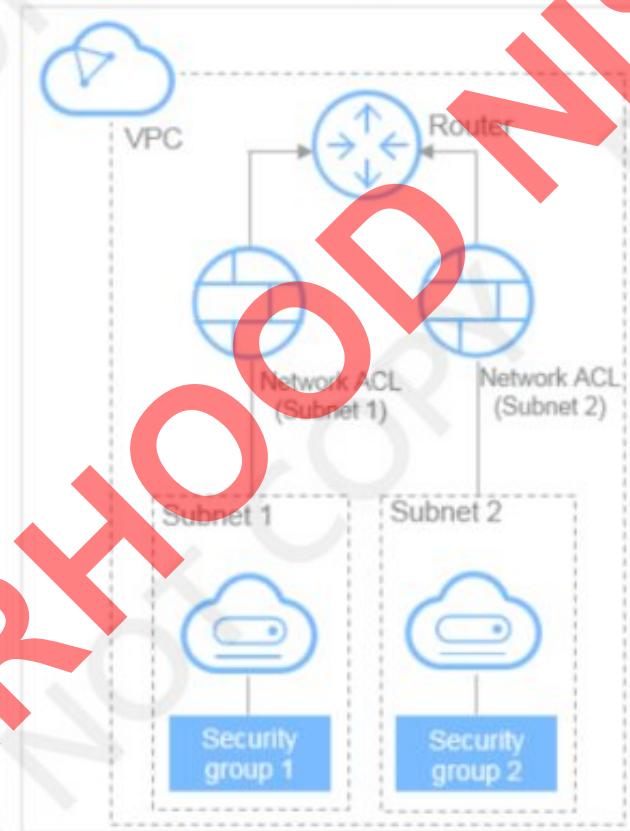
# VPC Peering Connection

- A VPC peering connection is a network connection between two VPCs in the same region. It enables you to route traffic between them using private IP addresses. You can create a VPC peering connection between your own VPCs, or between your VPC and a VPC of another account within the same region. However, you cannot create a VPC peering connection between VPCs in different regions.



## Network ACL

- A network ACL is an optional layer of security for your subnets. After you associate one or more subnets with a network ACL, you can control traffic in and out of the subnets.



# What Is Elastic IP

- An EIP is a public IP address that can be accessed directly over the Internet. An EIP consists of a public IP address and some amount of public network egress bandwidth. EIPs can be bound to or unbound from ECSs, BMSs, virtual IP addresses, NAT gateways, and load balancers.

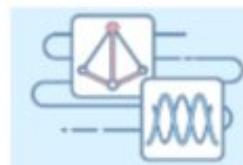
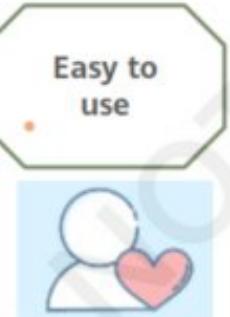


# What Is ELB?

- Elastic Load Balance (ELB) automatically distributes incoming traffic across multiple backend servers based on the listening rules you configure. ELB expands the service capabilities of your applications and improves their availability by eliminating single points of failure (SPOFs).

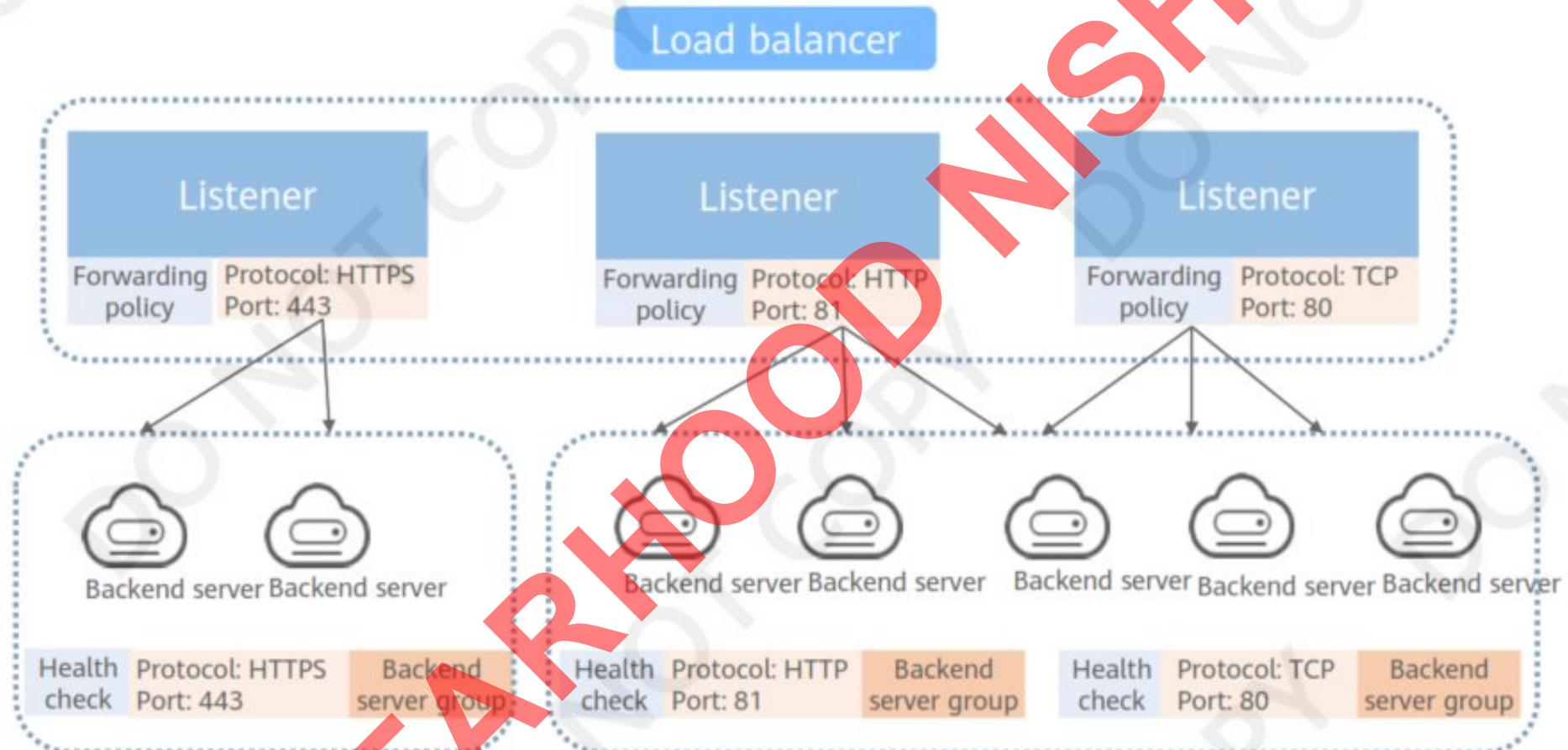


# ELB Advantages

- Cluster-based deployment, intra-city active-active DR for multiple AZs, and seamless real-time switchover
  - 
  - Robust performance**
- A cluster supports 100 million concurrent connections, meeting users' massive service access requirements.
- Supports multiple allocation policies and forwarding policies, and forwards traffic in multiple modes to meet different forwarding requirements.
  - 
  - Flexible forwarding**
- Automatic distribution based on application traffic, seamless integration with the AS service, and flexible expansion of external service capabilities of user applications
  - 
  - Flexible Scalability**
- Deploy the ELB quickly and take effect in real time.
  - 
  - Boundless Load Balancing**
- Multiple scheduling algorithms are available.
  - 
  - Easy to use**

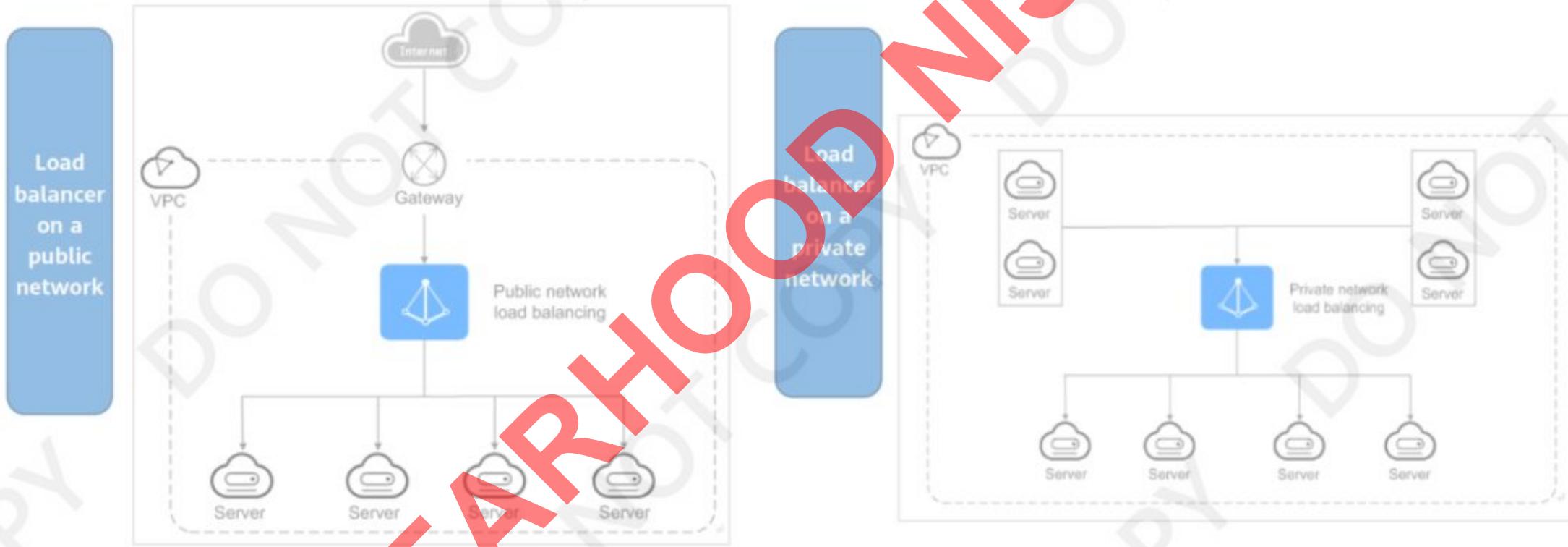
# ELB Architecture

- ELB consists of three components: load balancers, listeners, and backend server groups.



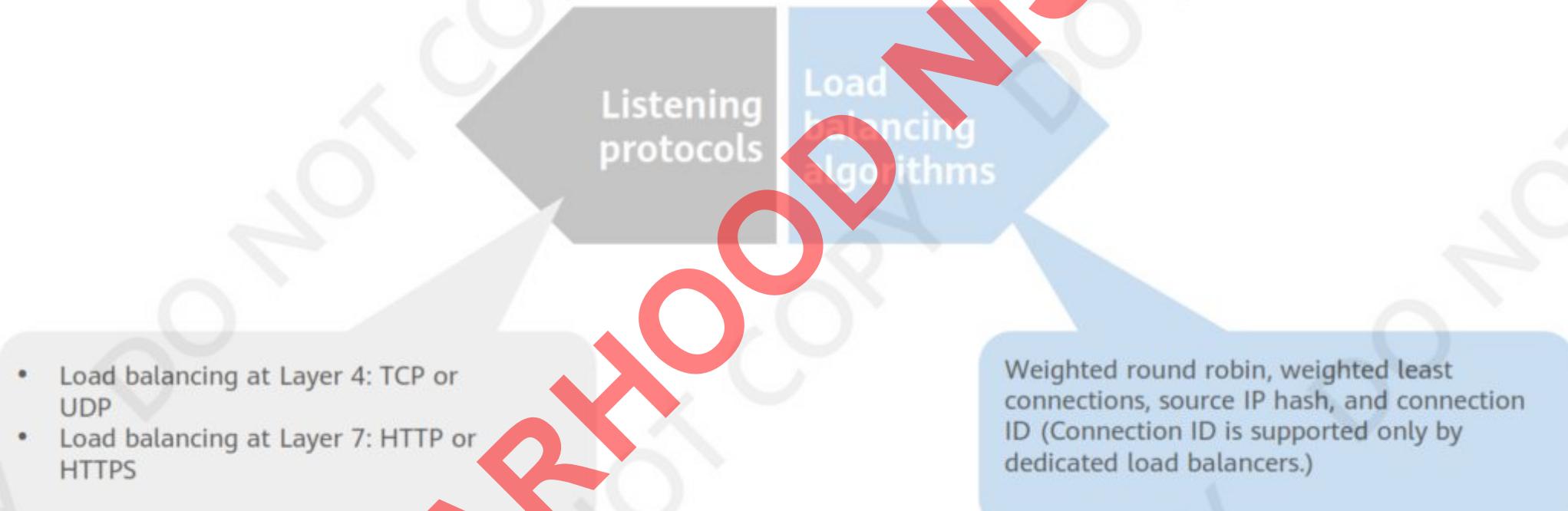
# ELB - Load Balancer

- A load balancer distributes incoming traffic across multiple backend servers. Load balancers can work on both public and private networks.



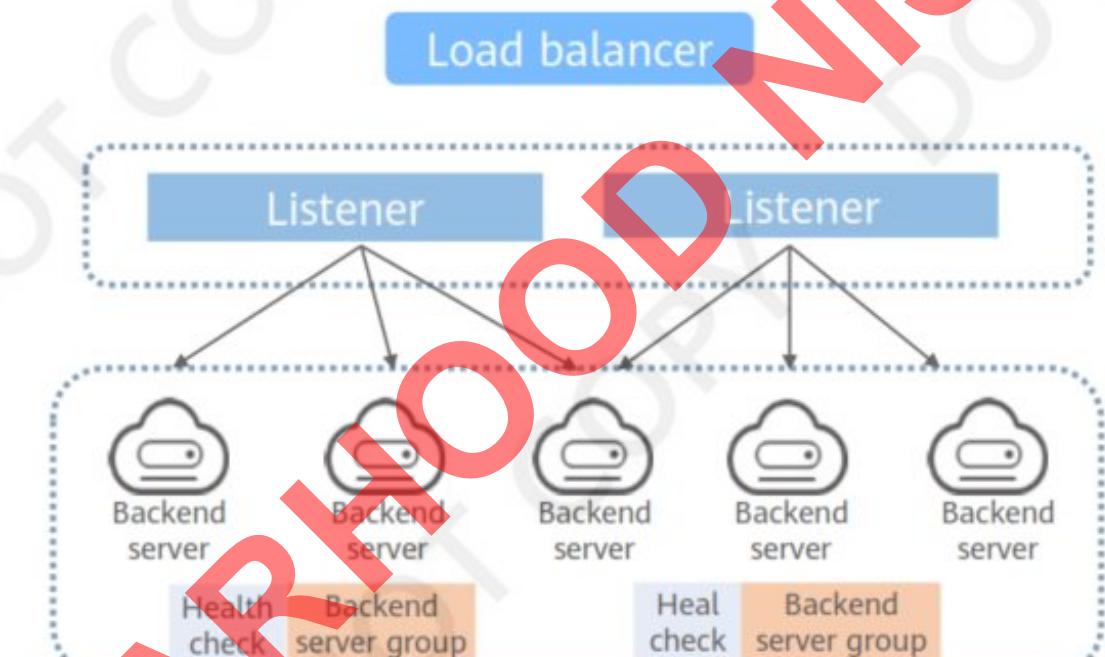
## ELB - Listener

- A listener listens on requests from clients and routes the requests to backend servers based on the settings that you configure when you add the listener.



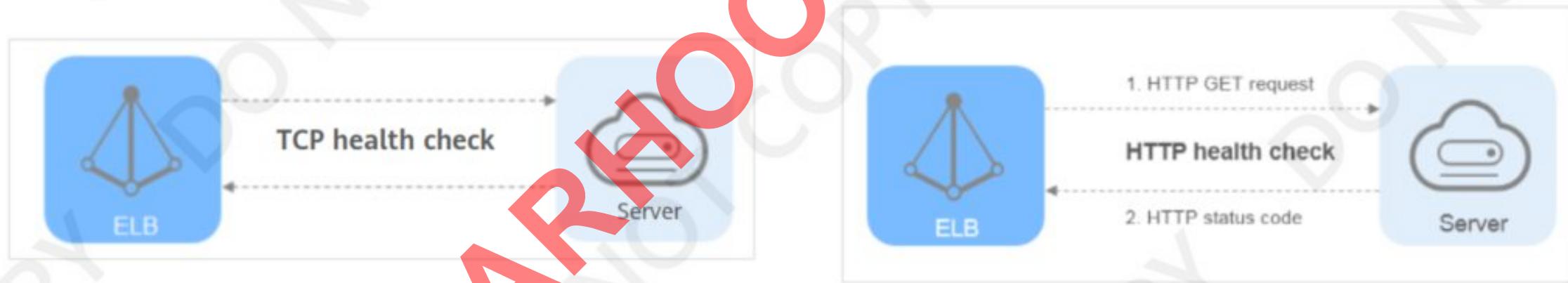
# ELB-Backend Server Group

- A backend server group is a group of cloud servers that have same features. When you add a listener, you select a load balancing algorithm and create or select a backend server group. Incoming traffic is routed to the corresponding backend server group based on the listener's configuration.



## ELB - Health Check

- ELB periodically sends heartbeat messages to associated backend servers to check their health and ensure that traffic is distributed only to healthy servers. This can improve the availability of your applications. If a backend server is unhealthy, the load balancer stops routing traffic to it. The load balancer will resume routing requests to the backend server after it recovers.



# ELB Configuration Process

## 1. Creating a Load Balancer

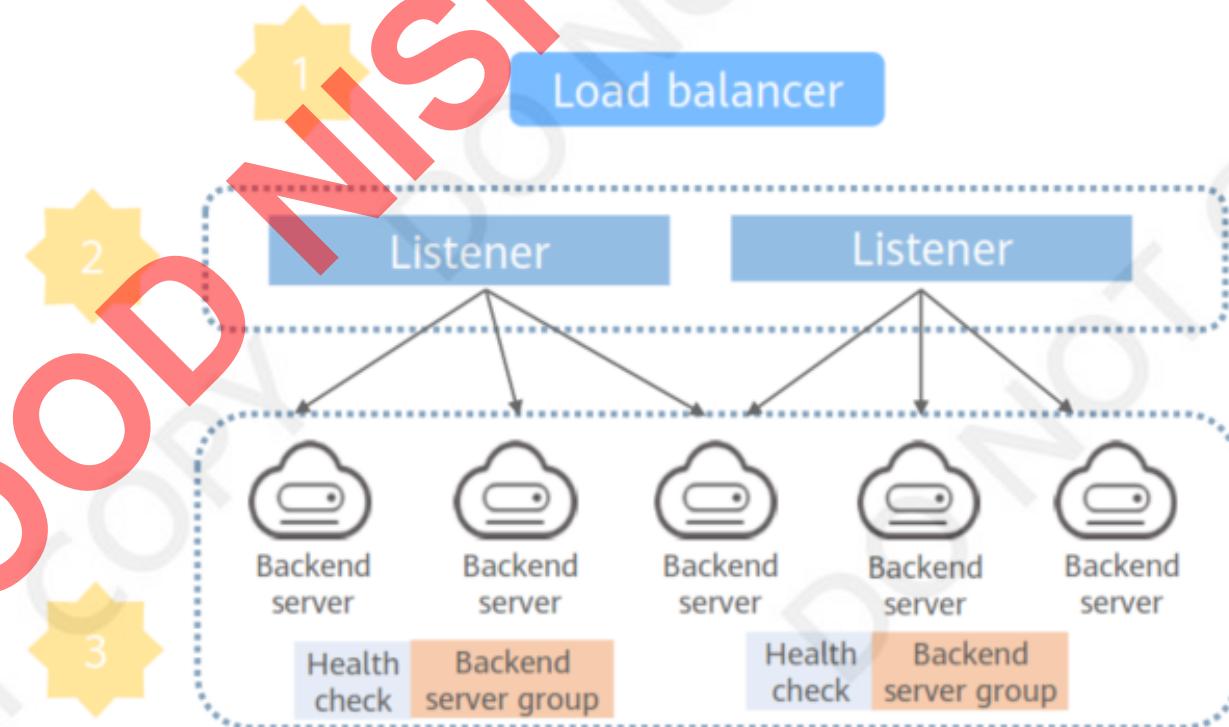
- Click Buy Elastic Load Balancer.
- Select the load balancer type.
- Configure the network.

## 2. Adding a Listener

- Locate the created load balancer.
- Configure the protocol and port.

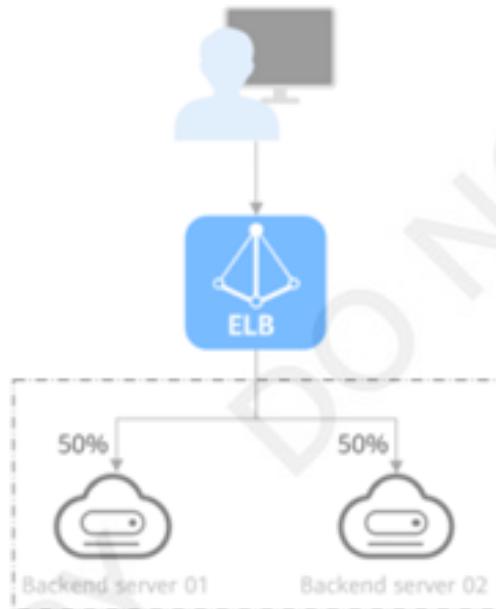
## 3. Adding a Backend Server Group

- Select a load balancing algorithm.
- Configure a health check.

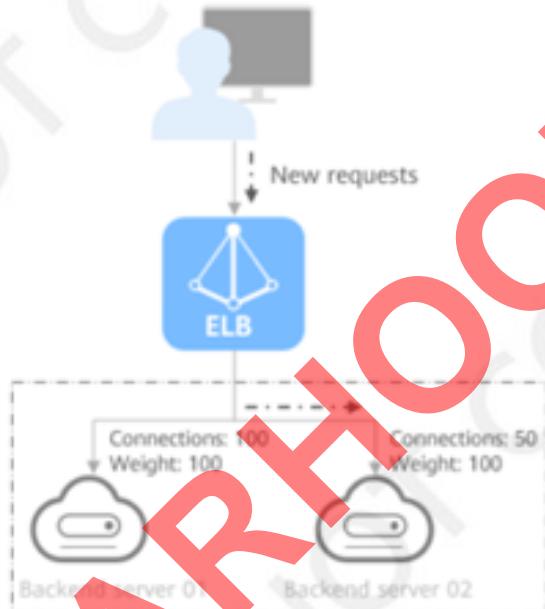


# ELB - Load Balancing Algorithms

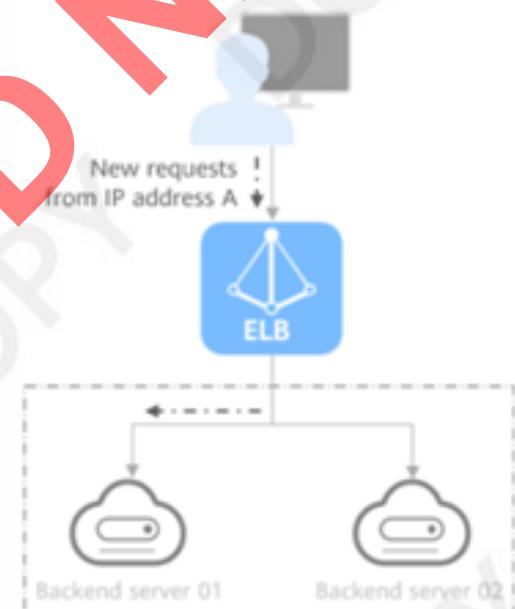
- The load balancer forwards the request from the client to the backend server for processing. You can add an ECS instance as the backend server of the load balancer. The listener uses the configured protocol and port to check connection requests from clients and forwards the requests to backend ECSs in the backend server group based on the user-defined allocation policy. The specific policies are as follows:



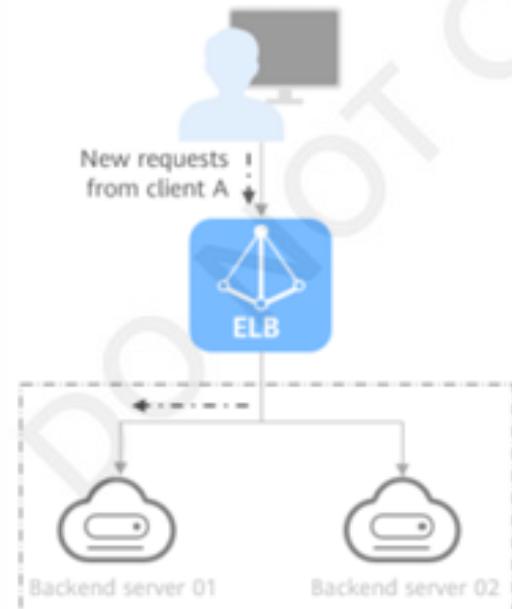
Weighted Round robin



Weighted Least connections



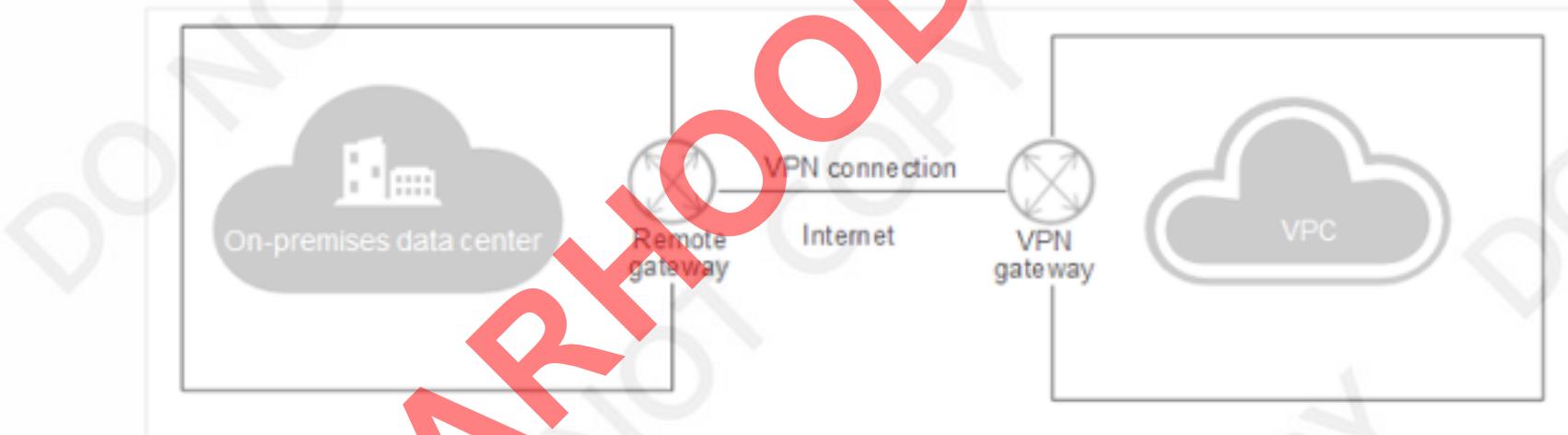
Source IP hash



Connection ID

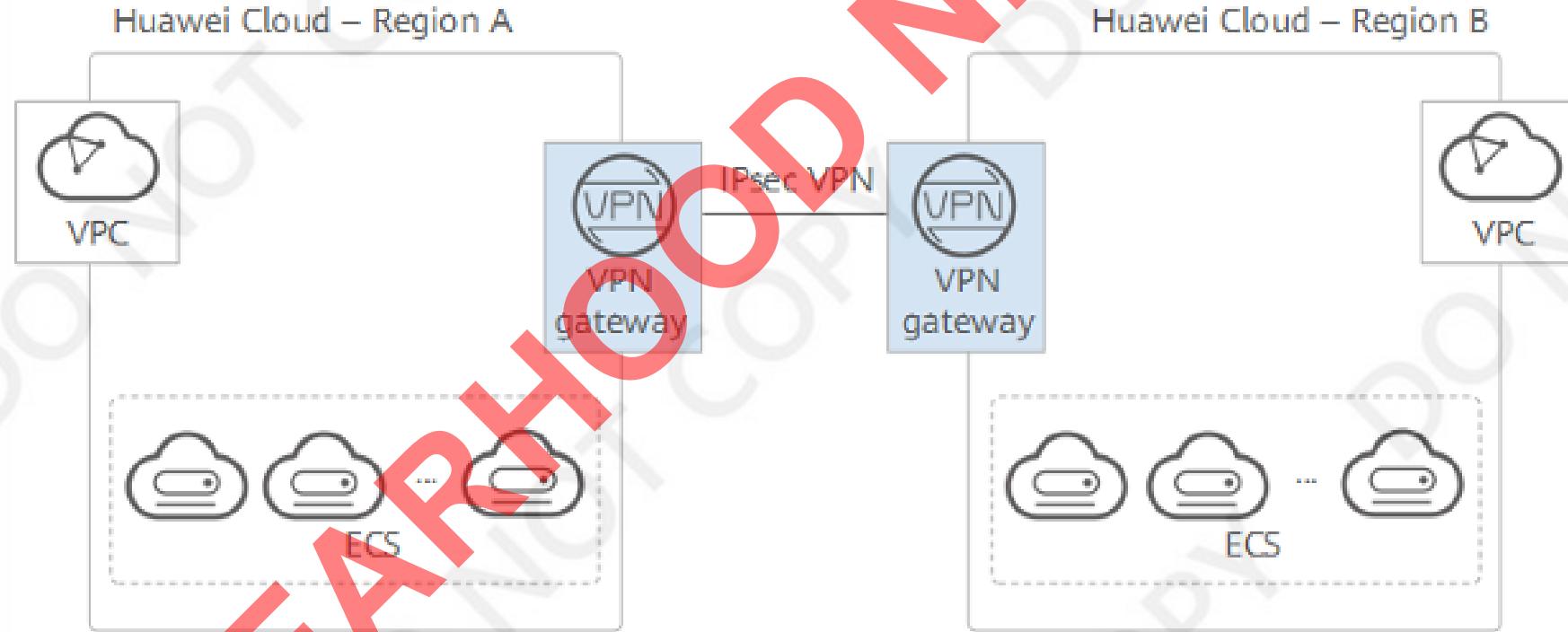
# Virtual Private Network

- Virtual Private Network (VPN) allows you to establish an encrypted, Internet-based communications tunnel between your on-premises data center and a VPC, so you can access resources in the VPC remotely.



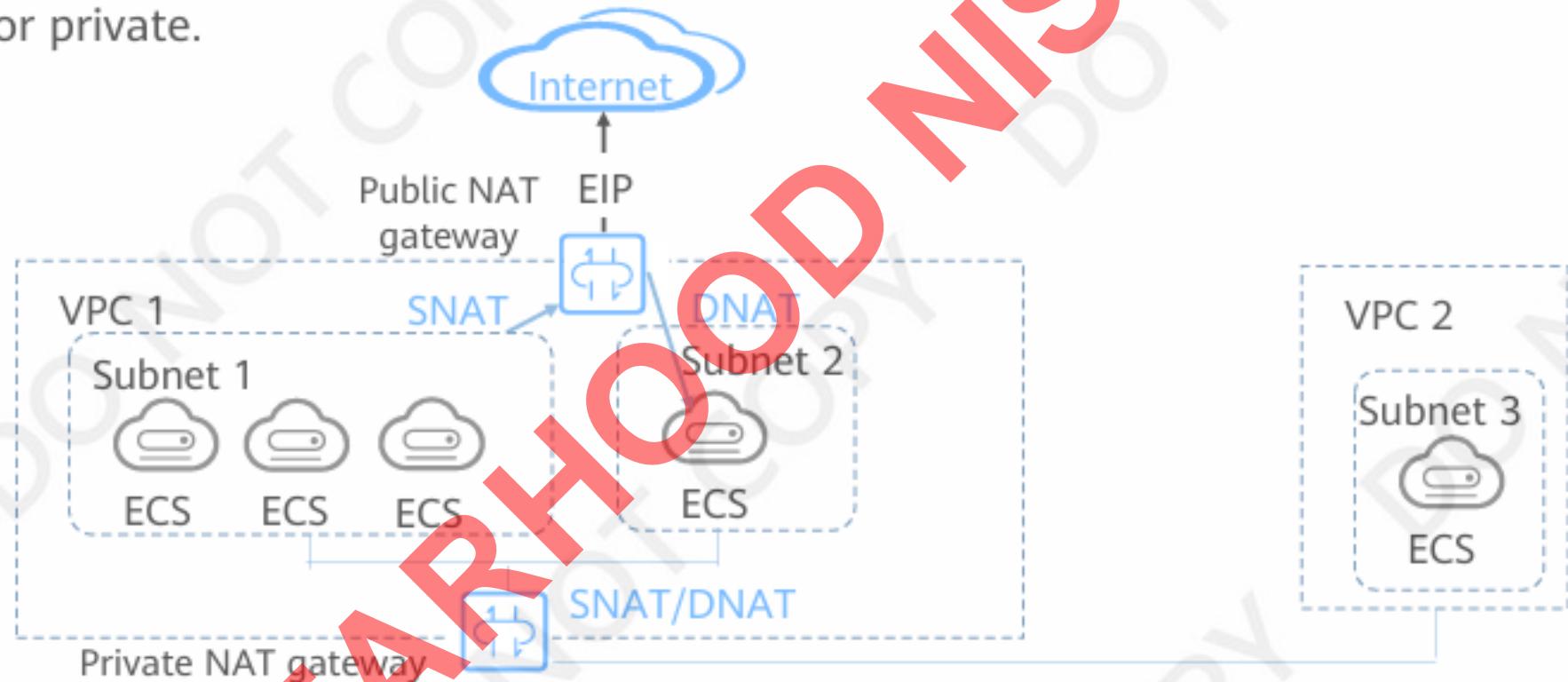
# Application Scenario – Cross-Region Interconnection Between VPCs

- With VPNs, you can connect VPCs in different regions to enable connectivity between user services in these regions.



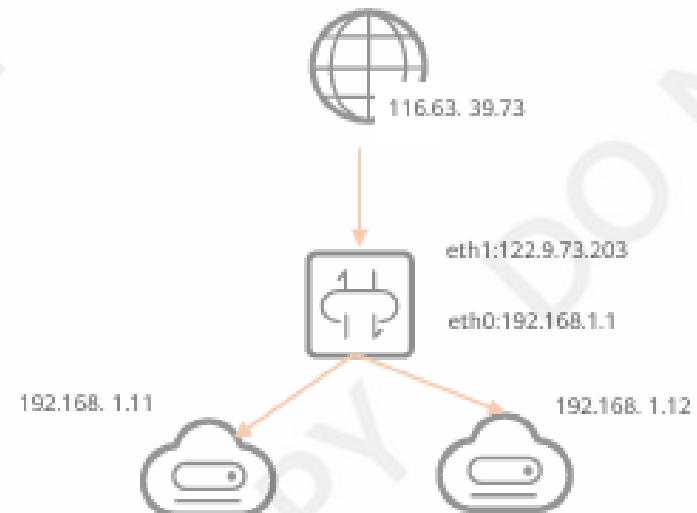
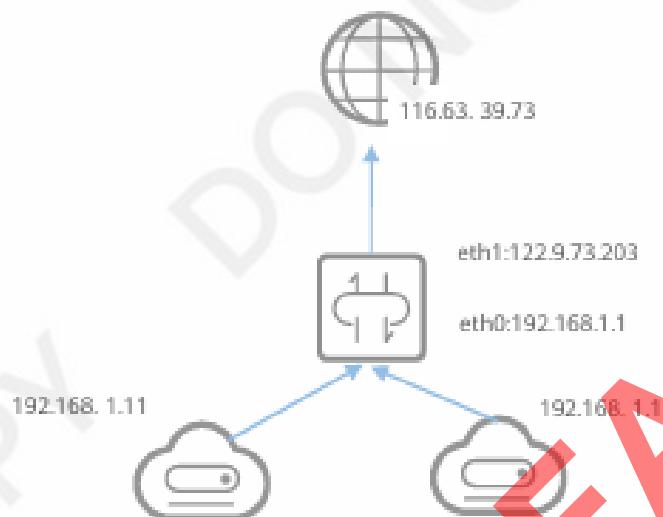
# NAT Gateway

- The NAT Gateway service provides network address translation (NAT) service for servers in a VPC and enables servers to share an EIP to access the Internet. NAT gateways can be either public or private.



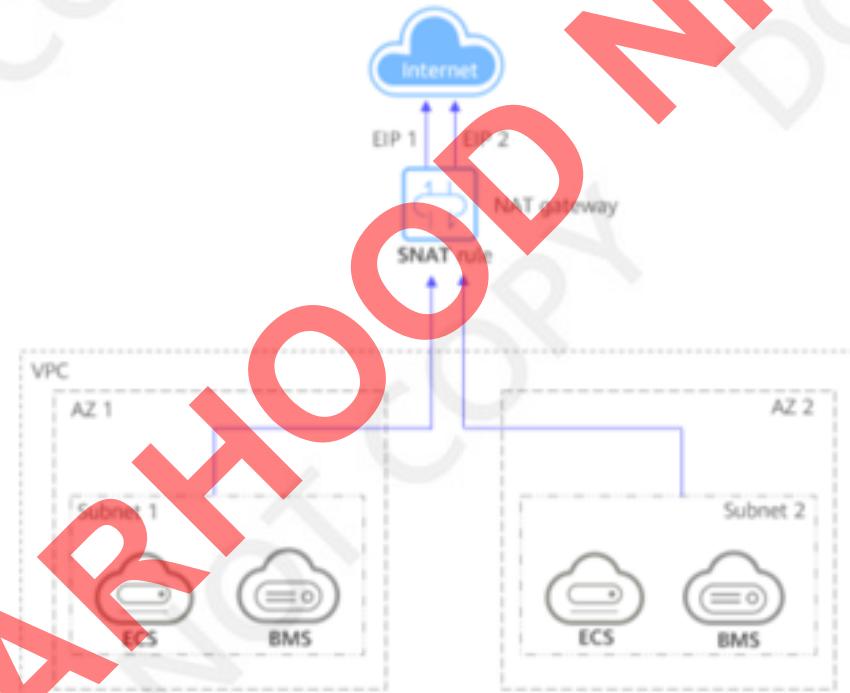
# SNAT and DNAT

- Source network address translation (SNAT): During NAT, only the source address in packets is translated. This NAT mode applies to the scenario where private network users access the public network.
- Destination network address translation (DNAT): During NAT, only the destination address and port number in packets are translated. DNAT applies to the scenario where public network users access private network services.



# Application Scenario - Using SNAT to Access the Public Network (Public Network NAT)

- When the ECSs in a VPC need to access the public network and a large number of requests are sent, the NAT gateway can provide different number of connections to save EIP resources and prevent the ECS IP addresses from being exposed to the public network. Based on the service plan, you can create multiple SNAT rules to share EIP resources.



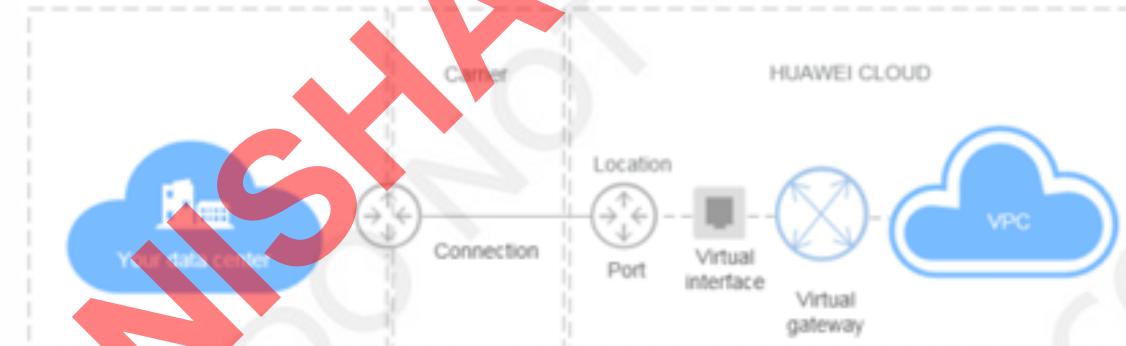
# What Is DNS?

- Domain Name Service (DNS) provides highly available and scalable authoritative DNS services that translate domain names into IP addresses required for network connection, reliably directing end users to your applications.



# What are DC and CC?

- Direct Connect allows you to establish a stable, high-speed, low-latency, secure dedicated network connection that connects your on-premises data center to Huawei Cloud. Direct Connect allows you to maximize legacy IT facilities and leverage cloud services to build a flexible, scalable hybrid cloud computing environment.
- Cloud Connect allows you to connect Virtual Private Clouds (VPCs) in different regions to allow instances in these VPCs to communicate over a private network as if they were within the same network.



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