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User Manual

金蝶Apusic负载均衡器

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目录

1 Preface

This document is the user manual for Apusic Load Balancer Software V2.0.5 Standard Edition, introducing the Apusic Load Balancer product to users and helping them get started quickly.

2 Target Audience

This user manual is primarily intended for developers using Apusic Load Balancer, as well as related management personnel and operations staff.

3 Version Update Notes

This document is updated according to actual circumstances, and the latest version includes historical modification records.

Date	Manual Version	Applicable Product	Update Description
December 2024	V2.0.2	ALB V2.0.2 Agile Edition	Modified ALB high availability and authentication usage documentation
August 2025	V2.0.5	ALB V2.0.5 Standard Edition	New version user manual, added console usage instructions
December 2025	V2.0.5	ALB V2.0.5 Standard Edition	Added user case configuration and ebpf usage documentation

4 Product Introduction

4.1 Product Overview

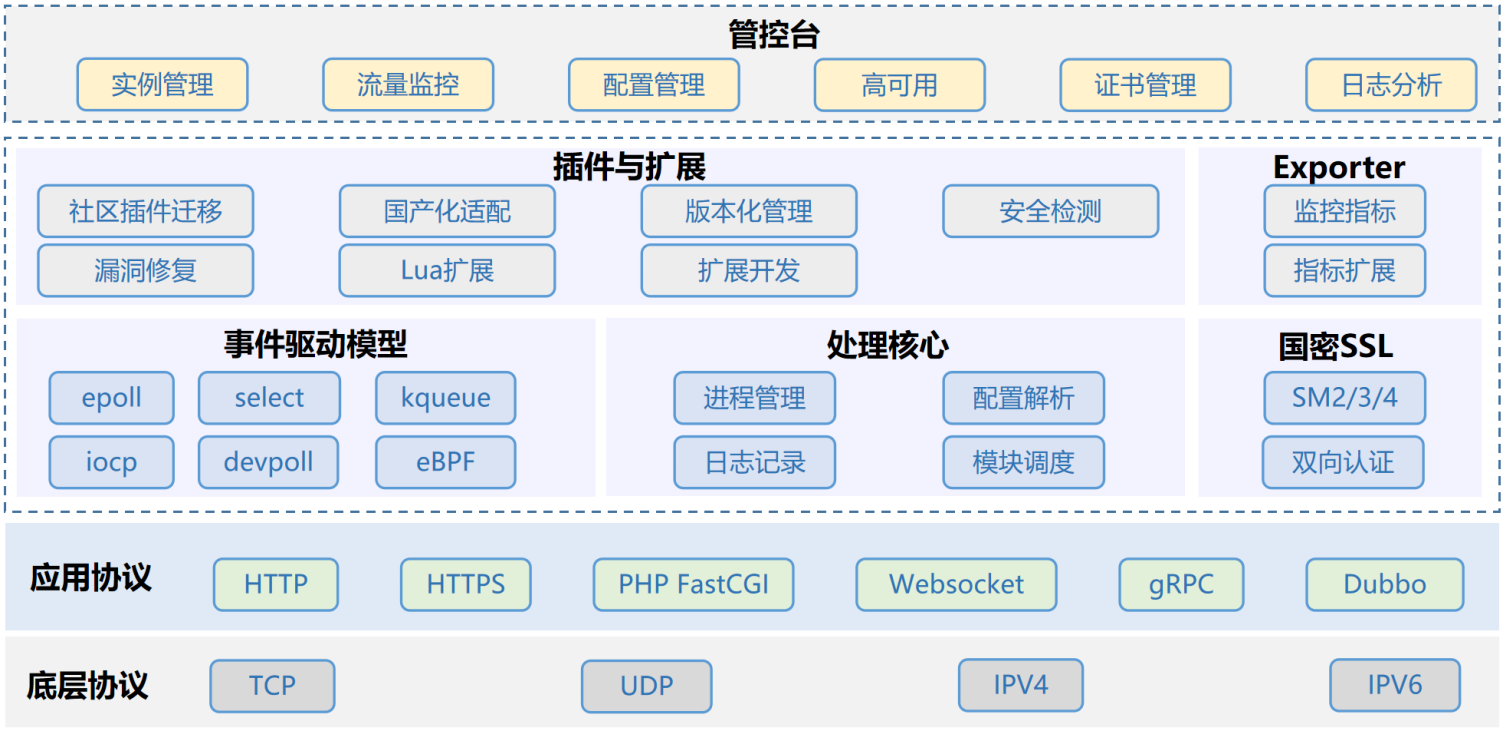
Apusic Load Balancer Software Standard Edition (Apusic Load Balancer, ALB) is a lightweight, high-performance, and highly available load balancer software. ALB can effectively address the challenges of request and traffic management for large-scale service clusters when facing clients, taking on the responsibilities of request security control, verification, filtering, as well as load balancing and reverse proxy. Through these functions, ALB successfully isolates the direct impact of client access on service application systems, platforms, and their resources, achieving effective control, refined management, and balanced distribution of cluster access traffic, ensuring service stability and efficiency.

4.2 Core Functions

Function	Description
Static File Service	Supports static file caching, resumable downloads, and other features to achieve fast, low-latency static content distribution.
Reverse Proxy	Supports HTTP, HTTPS, TCP, UDP, and other protocols to implement reverse proxy functionality.
Mail Proxy	Supports mail protocols to implement mail proxy functionality.
Load Balancing	Supports Layer 4 and Layer 7 load balancing.
Security	Supports HTTPS protocol and Chinese national cryptography SSL mutual authentication, ensuring secure and trusted communication between clients and servers.
Lua Extension	Supports writing extension plugins in Lua language to implement custom traffic processing logic.
Cross-Platform	Supports domestic software and hardware platforms, including: Kunpeng, Loongson, Zhaoxin, Hygon, and other domestic software and hardware platforms.
Monitoring	Supports monitoring collection and display of ALB node running status, traffic, performance, configuration, logs, etc.

4.3 Product Architecture and Functions

The architecture design of ALB Standard Edition is efficient, stable, and easy to extend. It uses a multi-process model to handle network requests, ensuring high performance and high concurrency capabilities. Through modular design, ALB Standard Edition can flexibly add new functions to meet different business scenario requirements. ALB Standard Edition architecture supports various network services from simple web servers to complex load balancing and reverse proxy, while ensuring ease of operation and service reliability.



4.3.1 Service Proxy

Function	Description
Static File Service	Supports static file caching, resumable downloads, and other features to achieve fast, low-latency static content distribution.
Reverse Proxy	Supports HTTP, HTTPS, FastCGI, WebSocket, gRPC, TCP, UDP, and other protocol proxies.
Mail Proxy	Supports mail protocols to implement mail proxy functionality.
Protocol Support	HTTP2/HTTP3, supports IPv4 and IPv6 protocols
High Availability	Supports high availability cluster deployment, achieving active-standby high availability through VIP

4.3.2 Load Balancing

Function	Description

Round Robin	Each request is assigned to different backend servers in chronological order.
Weighted Round Robin	Generates node traffic ratio based on node weights, used when backend server performance is uneven.
Least Connections	Selects the node with the fewest connections to upstream service nodes as the forwarding node.
Sticky Session	Maintains client association with session, ensuring requests from the same client are always directed to the same backend server during the session, achieving session consistency.
IP Hash	Calculates target node based on IP address hash, ensuring each visitor accesses a fixed backend server, which can solve session consistency issues.

4.3.3 Traffic Management

Function	Description
Request Rate Limiting	Limits request rate to prevent upstream services from being overwhelmed by too many requests at the same time.
Request Count Limiting	Limits the number of client requests per unit time.
Concurrency Limiting	Limits the number of connections allowed per unit time for clients.
Canary Release	Implements canary release for services, testing new features to ensure new features work properly.

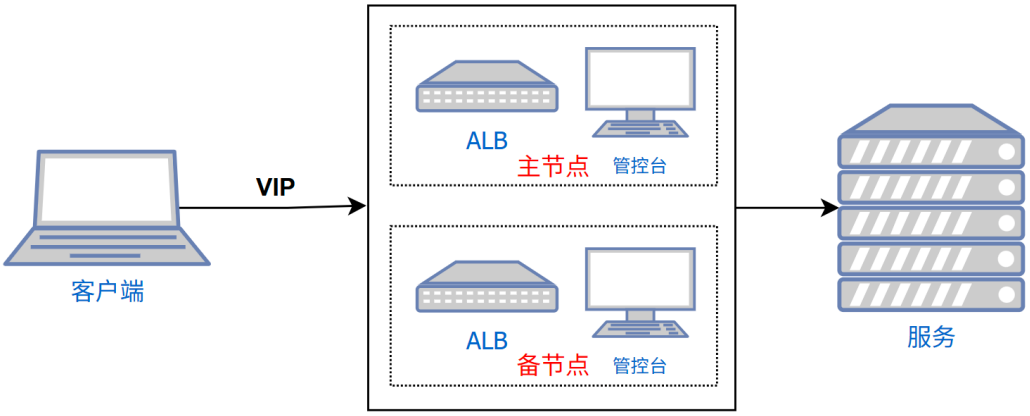
4.3.4 Security

Function	Description
HTTP/HTTPS Protocol	Supports HTTP/HTTPS protocols, ensuring secure and trusted communication between clients and servers.
Chinese National Cryptography SSL	Supports Chinese national cryptography SSL mutual authentication, ensuring secure and trusted communication between clients and servers.
Access Control	Supports IP access control, IP blacklist/whitelist, referer blacklist/whitelist, static resource anti-hotlinking, and other features.

4.3.5 Management and Control

Function	Description
Three-tier Role-based Access Control	Supports three-tier permission control, managing users, roles, and permissions.
Audit	Supports audit functionality, can view user operation logs.
Traffic Monitoring	Supports viewing real-time traffic data, as well as server load and other information
Configuration Management	Supports online management of configuration files, and automatic hot update of services

4.4 Deployment Architecture



The active-standby high availability deployment architecture of ALB Standard Edition is shown in the figure above, mainly including the following components:

- Active-standby ALB nodes: Provide load balancing services and configuration management.
- Console: Manages ALB node configuration, monitoring, high availability, etc.
- Services: Reverse proxy carrying business application systems.
- VIP: Virtual IP address, dynamically pointing to active-standby ALB nodes.

5 Product Installation

5.1 Installation Package Description

The ALB Standard Edition installation package name structure is:

`ALB-version-SE-build-date-CPU-architecture.tar.gz` or `ALB-version-SE-build-date-CPU-architecture-ebpf.tar.gz`

Currently only supports arm64 and amd64 architectures on Linux platform:

- Linux-arm64 architecture installation package: `ALB-V2.0.5-SE-build-date-arm64.tar.gz`
- Linux-amd64(x86_64) architecture installation package: `ALB-V2.0.5-SE-build-date-amd64.tar.gz`
- Linux-arm64 architecture `ebpf` feature installation package: `ALB-V2.0.5-SE-build-date-arm64-ebpf.tar.gz`
- Linux-amd64(x86_64) architecture `ebpf` feature installation package: `ALB-V2.0.5-SE-build-date-amd64-ebpf.tar.gz`

Note: The build date is the specific build date of the ALB product package. The same version may have multiple build dates. Please use the latest date when obtaining the installation package. The installation package names in all demonstrations in this manual have removed the build date.

Note: For `ebpf` feature installation package, Linux kernel version should not be lower than `4.19`.

5.1.1 Installation Media

- tar.gz compressed package: `ALB-version-SE-build-date-CPU-architecture.tar.gz` can be extracted to any path on the target machine for use.
- Docker image: `ALB-version-SE-build-date-CPU-architecture-docker.tar.gz` or `ALB-version-SE-Docker-build-date-CPU-architecture-base-os.tar.gz`.
- RPM package: `ALB-version-SE-build-date-CPU-architecture.rpm`, install using `rpm -ivh package-name`, after installation, the installation path is `/opt/ALB-SE-version`

5.2 Single Node Deployment

1. Obtain software installation package ALB installation media is: ALB-V2.0.5-SE-amd64.tar.gz or ALB-V2.0.5-SE-arm64.tar.gz
2. Copy installation package to target host

3. Extract: ALB-V2.0.5-SE-amd64.tar.gz to target installation path (example is /opt directory)

`tar -zxvf ALB-V2.0.5-SE-amd64.tar.gz -C /opt/` 4. For ALB usage, refer to the [Quick Start] section.

Note: If you don't have permission, please use root account or sudo

5.3 Cluster Deployment

The cluster deployment architecture is shown in the figure above. After completing the single node installation steps on the active and standby nodes respectively, refer to the high availability deployment document in this document for configuration.

5.4 Docker Deployment

ALB Standard Edition provides Docker system installation packages for arm and x86, and ALB can be deployed directly through the ALB Docker installation package.

5.4.1 Installation Package Description

1. ALB compressed installation package name

- `ALB-V2.0.5-SE-docker-amd64.tar.gz` or `ALB-V2.0.5-SE-Docker-20250225-amd64-kylin.tar.gz`
- `ALB-V2.0.5-SE-docker-arm64.tar.gz` or `ALB-V2.0.5-SE-Docker-20250225-arm64-kylin.tar.gz`

Note: The installation package date may be different, please choose according to the actual situation.

2. Installation package directory structure

```
tree -l 1 ALB-V2.0.5-SE-Docker-20250225-amd64-kylin
ALB-V2.0.5-SE-Docker-20250225-amd64-kylin           # Directory
after docker installation package extraction
|-- ALB-V2.0.5-SE-Docker-20250225-amd64-kylin.tar.gz # Docker image
file
|-- alb                                             # ALB startup
configuration file, license file, logs and other mount directory
|   |-- alb.conf                                    # ALB
configuration file
|   |-- license.xml                                 # License file
```

```
-- alb-standard-dockercompose.yaml                          # docker
compose configuration file
```

5.4.2 Installation Steps

The following operations use ALB-V2.0.5-SE-Docker-20250225-amd64-kylin.tar.gz as an example

1. Extract and import image

- Extract `tar -zxvf ALB-V2.0.5-SE-Docker-20250225-amd64-kylin.tar.gz`
- Enter the extracted folder `cd ALB-V2.0.5-SE-Docker-20250225-amd64-kylin`
- Load image: `docker load < ALB-V2.0.5-SE-Docker-20250225-amd64-kylin.tar.gz`

2. Modify license file

ALB license file needs to be mounted to the container internal installation directory, the current example is `alb/license.xml`, please replace the license file before starting the container.

> *License file mount description*
>
> - *license.xml supports legacy license*
> - *license.xml supports KBC license (if it is KBC license, copy the kbc license content to license.xml)*
> - *acls.properties unified license configuration file needs to be added and mounted to the container path: `/opt/ALB-V2.0.5-SE`*

3. Image startup and stop

- Start command: `docker-compose -f alb-standard-docker-compose.yaml up -d`
- Stop command: `docker-compose -f alb-standard-docker-compose.yaml down`

4. `alb-standard-docker-compose.yaml` configuration description

```
version: '3'
services:
  alb:
    image: harbor.apusic.com/apusic/alb:V2.0.5-ae.20250225-kylin-
amd64    # ALB image
    ports:
      - 8080:8080           # ALB http external port
      - 8887:8887           # ALB console port
    volumes:
      - ./alb/alb.conf:/opt/ALB-V2.0.5-SE/conf/alb.conf      # alb
```

```
configuration file
      - ./alb/license.xml:/opt/ALB-V2.0.5-SE/license.xml     # alb
license file
      - ./alb/logs:/opt/ALB-V2.0.5-SE/logs                   # alb
access and error log storage directory
    command: bash /opt/ALB-V2.0.5-SE/bin/start-alb-and-console.sh
```

5.5 K8s Deployment

ALB Standard Edition supports deployment through Kubernetes. Below are the detailed deployment steps.

5.5.1 Preparation

- Environment Requirements
    - kubectl is installed and Kubernetes cluster access permissions are configured.
    - If using a private image registry (such as Harbor), ensure the cluster has permission to pull images.
- Image Preparation
    - Upload Docker image to image registry (using AMD64 image as example)

```
# Extract installation package
tar -zxvf ALB-V2.0.5-SE-Docker-20250225-amd64-kylin.tar.gz
# Switch to extracted installation package
cd ALB-V2.0.5-SE-Docker-20250225-amd64-kylin
# Import ALB image
docker load < ALB-V2.0.5-SE-Docker-20250225-amd64-kylin.tar.gz
# Re-tag image, please modify according to your image registry
address
docker tag [Image ID] harbor.apusic.com/apusic/alb:V2.0.5-
ae.20250225-kylin-amd64
# Push image to image registry
docker push [Image ID]
```

5.5.2 Configuration File and License Management

- Create ConfigMap Mount `alb.conf` configuration file to container:

```
kubectl create configmap alb-config --from-file=./alb/alb.conf
```

- Create Secret Store `license.xml` license file as Secret (sensitive information is recommended to use Secret):

```
kubectl create secret generic alb-license --from-
file=./alb/license.xml
```

5.5.3 Deploy ALB Service

1. Create Deployment Write alb-deployment.yaml file:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: alb
spec:
  replicas: 1
  selector:
    matchLabels:
      app: alb
  template:
    metadata:
      labels:
        app: alb
    spec:
      containers:
      - name: alb
        image: harbor.apusic.com/apusic/alb:V2.0.5-se.20250225-
kylin-amd64 # Please modify according to registry address
        command: ["bash", "/opt/ALB-V2.0.5-SE/bin/start-alb-and-
console.sh"]
```

```
        ports:
        - containerPort: 8080
        - containerPort: 8887
        volumeMounts:
        - name: alb-config
          mountPath: "/opt/ALB-V2.0.5-SE/conf/alb.conf"
          subPath: "alb.conf"
        - name: alb-license
          mountPath: "/opt/ALB-V2.0.5-SE/license.xml"
          subPath: "license.xml"
        - name: alb-logs
          mountPath: "/opt/ALB-V2.0.5-SE/logs"
      volumes:
      - name: alb-config
        configMap:
          name: alb-config
      - name: alb-license
        secret:
          secretName: alb-license
      - name: alb-logs
        hostPath:
          path: "/var/alb/logs"
          type: DirectoryOrCreate
```

Parameter description

- image: Replace with actual image address.
- hostPath: Log directory mount path, can be changed to PVC as needed (such as using cloud storage).

2. Create Service

```
apiVersion: v1
kind: Service
metadata:
  name: alb-service
spec:
  type: NodePort
```

```
  selector:
    app: alb
  ports:
  - name: http
    port: 8080
    targetPort: 8080
    nodePort: 30080
  - name: console
    port: 8887
    targetPort: 8887
    nodePort: 30887
```

Parameter description

- nodePort default range is 30000-32767, if port is omitted, it will be automatically assigned by the system
- In cloud environment, type can be changed to LoadBalancer to directly get external IP

3. Apply configuration

```
kubectl apply -f alb-deployment.yaml
kubectl apply -f alb-service.yaml
```

5.5.4 Deployment Verification

1. Check Pod status

```
kubectl get pods -l app=alb
```

2. Access service

- HTTP service: `http://<node-ip>:30080`
- Console: `http://<node-ip>:30887`

5.5.5 Stop and Cleanup

1. Delete deployment

```
kubectl delete -f alb-deployment.yaml -f alb-service.yaml
```

2. Clean up configuration

```
kubectl delete configmap alb-config
kubectl delete secret alb-license
```

6 Quick Start

Before using the product, you need to switch to the ALB installation directory, example is `/opt/ALB-V2.0.5-SE-amd64`, and place the applied ALB Standard Edition KBC license file `license.lic` in the installation directory.

6.1 Product Configuration

ALB core is compatible with Nginx configuration, the specific configuration file conf/alb.conf path is:

`Installation path/conf/alb.conf`

You can use Nginx configuration methods and content to configure ALB

6.2 Product Startup, Stop, Hot Reload, Uninstall, Verify Configuration File and Get License Code

- Start ALB instance and management console

```
cd /opt/ALB-V2.0.5-SE-amd64                # Enter installation
directory
./bin/start-alb-and-console.sh                    # Start alb and
management console
```

- Start ALB instance without starting console

```
cd /opt/ALB-V2.0.5-SE-amd64                # Enter installation
directory
./bin/start-alb.sh                       # Start alb
```

- Stop ALB instance and management console

```
cd /opt/ALB-V2.0.5-SE-amd64                # Enter installation
directory
./bin/stop-alb-and-console.sh                    # Stop alb and
management console
```

- Stop ALB instance

```
cd /opt/ALB-V2.0.5-SE-amd64              # Enter installation
directory
./bin/stop-alb.sh                       # Stop alb
```

- Hot reload

```
cd /opt/ALB-V2.0.5-SE-amd64              # Enter installation
directory
./bin/reload-alb.sh                     # Stop alb
```

- Uninstall
    - Extract installation package
        - Directly delete installation directory
    - rpm:
        - x86: `rpm -e ALB-SE-2.0.5-1.el7.x86_64`
        - arm64: `rpm -e ALB-SE-2.0.5-1.el7.aarch64`

- Verify configuration file

You can use -t parameter to verify if the configuration file has errors

Successful verification prompt: `syntax is ok` and `test is successful`

```
cd /opt/ALB-V2.0.5-SE-amd64              # Enter installation
directory
./sbin/alb -t                           # Verify if conf/alb.conf
configuration file has syntax errors
```

To verify a specific configuration file, you can use `-c` parameter to specify the configuration file

```
cd /opt/ALB-V2.0.5-SE-amd64              # Enter installation
directory
./sbin/alb -t -c conf/alb.conf           # Specify to verify if
```

```
conf/alb.conf configuration file has syntax errors

# Output
alb:the configuration file /opt/ALB-V2.0.5-SE-amd64/conf/alb.conf
syntax is ok
alb:configuration file /opt/ALB-V2.0.5-SE-amd64/conf/alb.conf test
is successful
```

- Get product license code

```
cd /opt/ALB-V2.0.5-SE-amd64            # Enter installation
directory
./bin/alb-authcode                  # Get alb license code on current
node
# Note: If multiple license codes appear, you can choose any one to
apply for license file

./bin/alb-authcode -ac eth0              # Get license code for
specified network interface
./bin/alb-authcode -ac 172.21.61.110     # Get license code for
specified IP
```

6.3 Configure Reverse Proxy

Steps are as follows:

1. Prepare the target reverse proxy server IP and service port.
2. Modify ALB configuration file, configure listening port and reverse proxy to target server.
3. Use hot reload command to update alb configuration.
4. Verify reverse proxy test.

> *Example: There is an ftp server: 172.21.32.42:8080, need to publish content through alb proxy, if alb node can access ftp server normally, you can configure alb's reverse proxy to proxy ftp service.*

1. Target proxy service: 172.21.32.42:8080
2. Modify alb.conf file, configure listening port and reverse proxy to target server.

```
# Add proxy server block in http block
http{
  # Omit other configuration content, the following server block is
added content
  server {
      listen 80;   # Listen on port 80

      location / {   # Forward all accessed urls to
172.21.32.42:8080
          proxy_pass http://172.21.32.42:8080/;
      }
  }
}
```

3. Use hot reload command to update alb configuration.

```
./bin/reload-alb.sh
```

4. Verify reverse proxy test.

```
curl http://172.21.32.42:80
```

6.4 Configure Static Resource Proxy

Steps are as follows:

1. Prepare static resources, upload to ALB node (172.21.32.42) /data/www directory.
2. Modify ALB configuration file, add static resource proxy configuration.
3. Use hot reload command to update alb configuration.

> *Example: First have a pure HTML and other static resources website, need to publish website through alb.*

1. Extract target website static resources to ALB node directory.
2. Modify alb.conf file, add static resource proxy configuration.

```
# Add proxy server block in http block
http{
  server {
    listen 80;
    location / {
      root /data/www;                    # Through root directive,
specify static resource path
      index index.html;                  # Default file for accessing
homepage, for example directly accessing /, then access index.html
      try_files $uri $uri/ /index.html; # Try to access uri, if
failed then try to access uri/, finally access index.html
    }
  }
}
```

3. Use hot reload command to update alb configuration.

```
./bin/reload-alb.sh
```

4. Verify static resource test.

```
curl http://172.21.32.42:80/index.html
```

6.5 Configure Dynamic and Static Separation

Steps are as follows:

1. Prepare static resources, upload to ALB node (172.21.32.42).
2. Prepare backend server nodes to be proxied.
3. Modify ALB configuration file, add dynamic and static separation configuration.
4. Use hot reload command to update alb configuration.

> *Example: There is a dynamic and static separation website, need to proxy static resources with url starting with static and API interfaces with url starting with api through ALB.*

1. Prepare static resources, upload to ALB node /data/www directory.

2. Backend API proxy service: 172.21.32.42:8080 and 172.21.32.43.8080.
3. Modify alb.conf file, add dynamic and static separation configuration.

```
http{

  # Define backend api server address
  upstream api {
    server 172.21.32.42:8080;
    server 172.21.32.43:8080;
  }

  server {
    listen 80;
    location /static/ {   # Forward url starting with static to
/data/www/static/
      root /data/www;
      index index.html;
    }
    location /api/ {   # Forward url starting with api to defined
upstream api
      proxy_pass http://api/;
    }
  }
}
```

4. Use hot reload command to update alb configuration.

```
./bin/reload-alb.sh
```

5. Verify dynamic and static separation test.

```
# Get static resource index.html
curl http://172.21.32.42:80/static/index.html
```

```
# Request api
curl http://172.21.32.42:80/api/user/list
```

7 Console Usage Instructions

ALB Console is a web-based management and monitoring tool that provides visual management of ALB load balancer, reducing the difficulty of direct user operations while improving management efficiency. ALB Console supports monitoring ALB running status, data traffic, node load conditions, configuration management, certificate management, high availability configuration, operation logs, etc.

7.1 Three-tier Role-based Access Control

ALB Console uses three-tier role management, the system provides four default roles:

- admin-security (Security Administrator), Security Administrator is mainly responsible for user management operations, such as: user registration, deletion, editing, viewing user list, viewing user details.
- admin-audit (Audit Administrator), Audit Administrator is mainly responsible for security audit operations, such as: viewing operation log list, viewing operation log details.
- admin-alb (System Administrator), System Administrator is mainly responsible for all ALB management operations, such as: instance traffic viewing, configuration management, SSL certificate management, log viewing, high availability configuration, etc.
- user-alb (Regular User), Regular User only supports viewing of all ALB operations, without any modification permissions.

Four roles initial default users and passwords:

Role Name	Username	Initial Password
Security Administrator	admin-security	Apusic@alb@admin1
Audit Administrator	admin-audit	Apusic@alb@admin2
System Administrator	admin-alb	Apusic@alb123

7.2 Console Login

The console login URLs are divided into the following two types:

1. Security Administrator/Audit Administrator: http://{ALB_IP}:8887/admin
2. System Administrator/Regular User: http://{ALB_IP}:8887

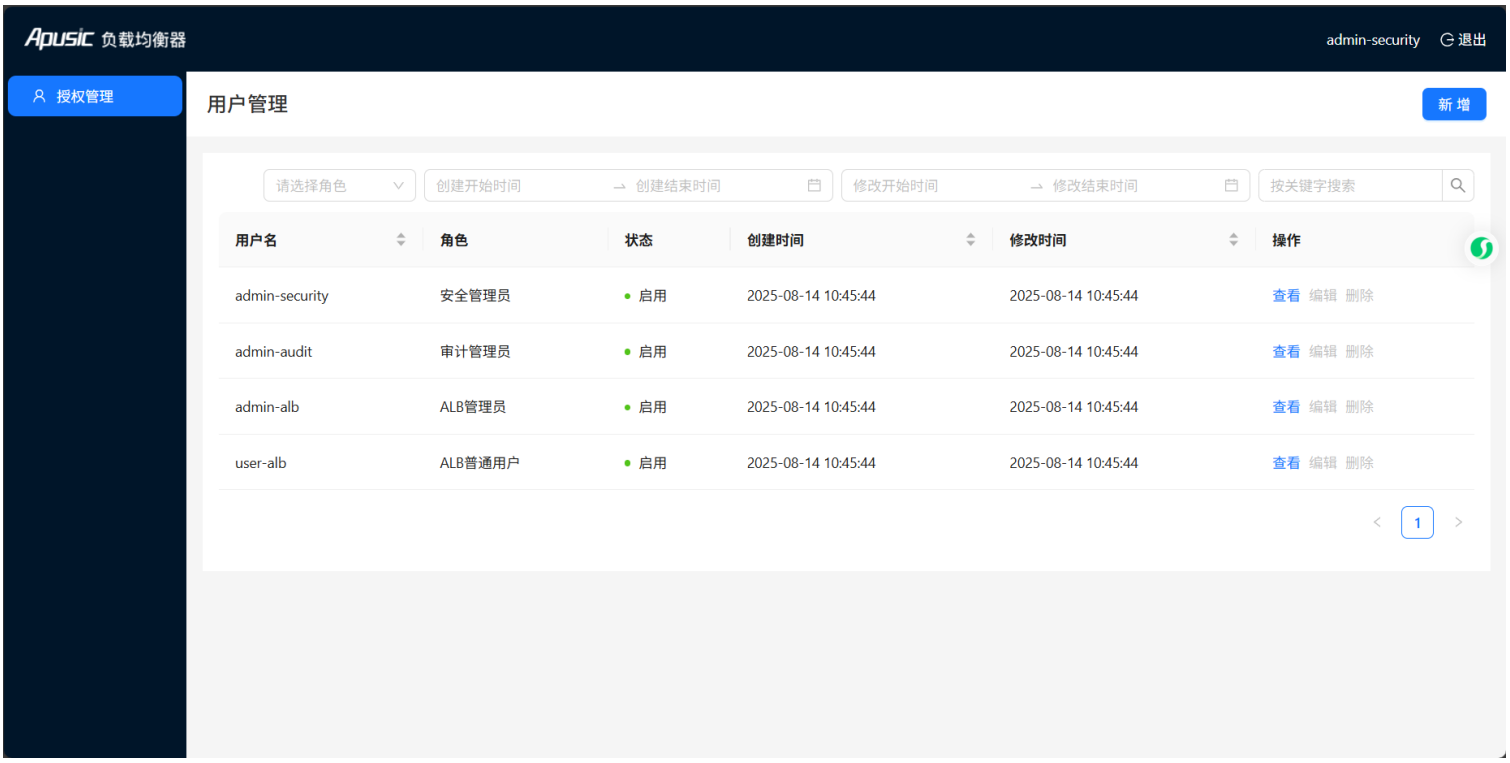
If you want to use https protocol, you need to open ALB console configuration file `ALB installation directory/console/conf/config.yaml` and modify the following configuration to enable https protocol:

```
......
system:
  ......
  # Use https
  https: true
  certfile: "./cert/cert.pem" # Default certificate file
  keyfile: "./cert/key.key" # Default key file
......
```

If you don't use the default certificate and key files, directly put your certificate and key files in `ALB installation directory/console/cert/` directory. Or put them in any directory, then modify configuration items `certfile` and `keyfile` to point to the corresponding files.

7.3 Security Administrator Operations

After the Security Administrator logs in successfully, the default page is as follows:

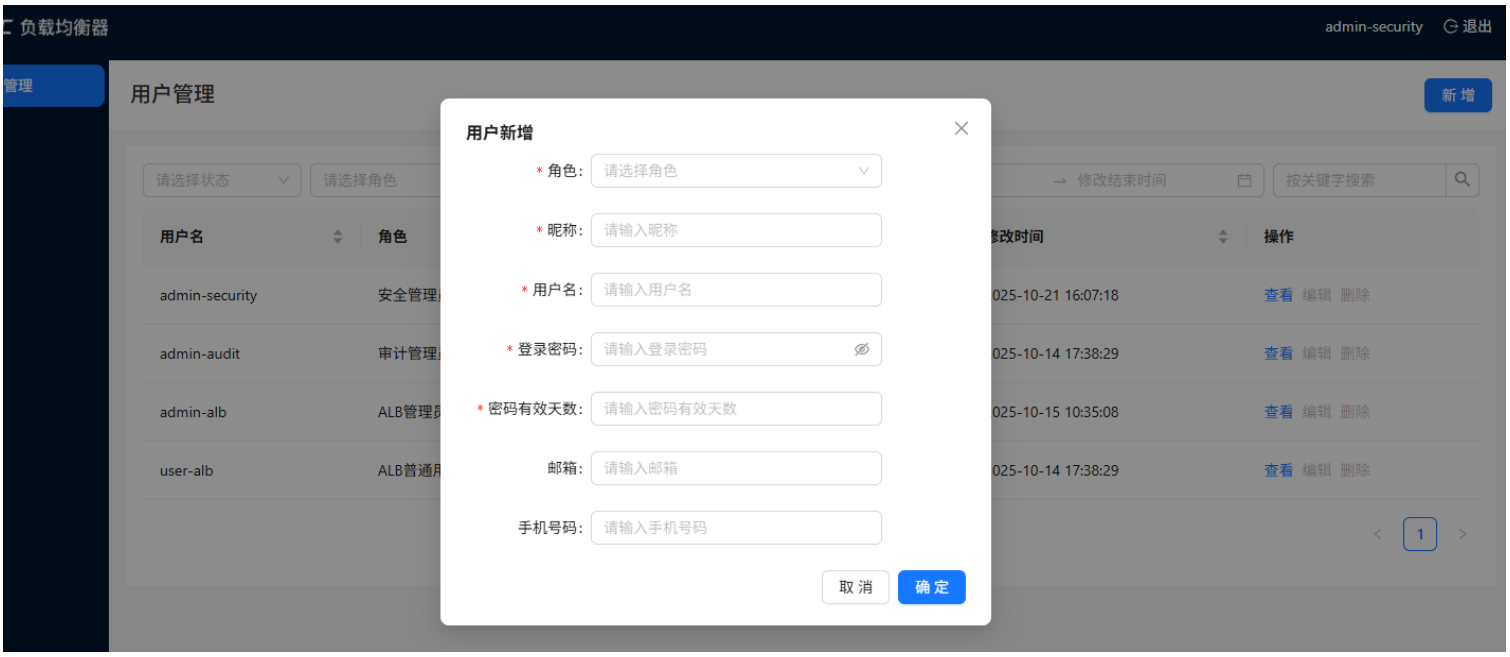


For each record, the following information is provided:

- Username: Indicates the user's name, unique user identifier
- Role: Indicates the user's role
- Status: Indicates the user's current status
- Created Time: Indicates the time when the user registered
- Modified Time: Indicates the time when the user was modified

7.3.1 Register User

Click "New" to enter the register user page

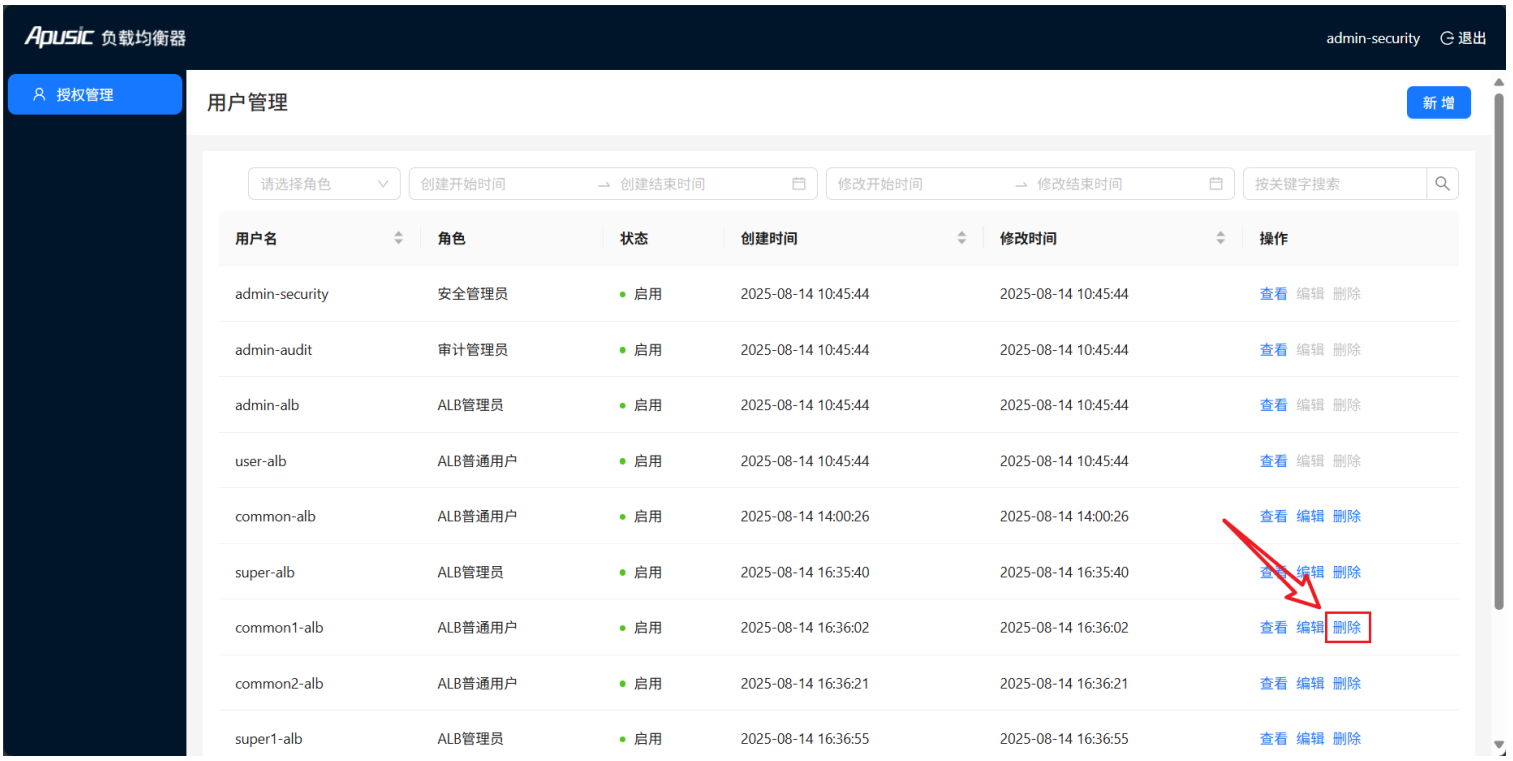


User information field description:

- Role: Select one of the four default roles provided by the system
- Nickname: User's alias, cannot be empty
- Username: User's identifier when logging into the system, unique, composed only of uppercase and lowercase letters, numbers, dots, underscores, hyphens
- Login Password: Composed of three of uppercase and lowercase letters, numbers, special characters (such as `!@#$%^&*`), and length between 8 to 50 characters
- Password Validity Days: The valid duration of the password since creating user/editing user password/user self-modifying password, unit is days, exceeding the duration, user needs to modify password, otherwise will be disabled. One week before password expiration, each login will prompt the password expiration time. User first login will also prompt to modify password. -1 means permanently valid
- Email: Conforms to common email format (not required)
- Phone: Conforms to Chinese mobile phone number format (not required)

7.3.2 Delete User

Select user, click "Delete" to delete the user, default users cannot be deleted



7.3.3 Edit User

Select user, click "Edit" to enter the edit page, you can edit user basic information, if the information before and after editing has not changed, it will prompt related information. Default users cannot be edited

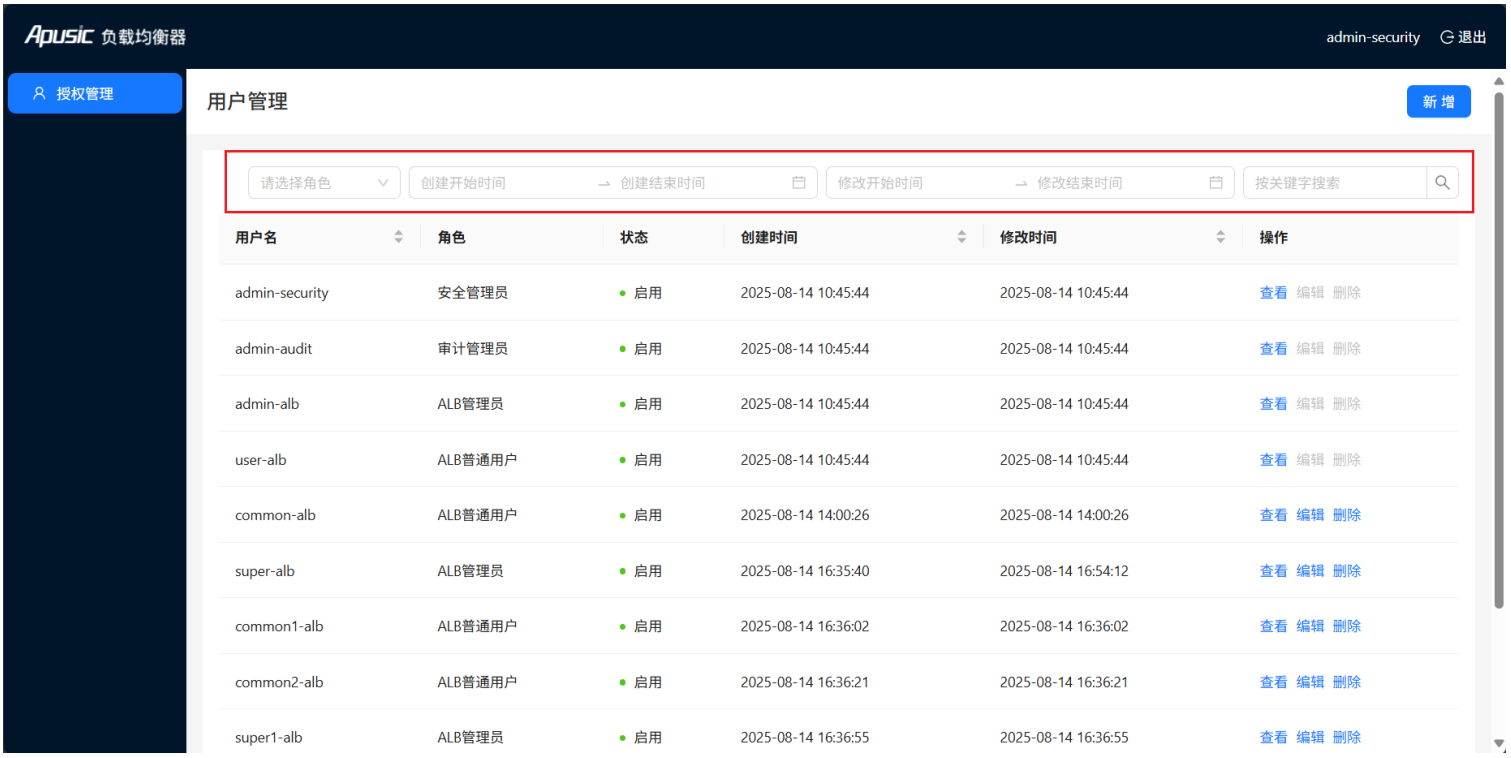
The difference between editing user and registering user is that editing user can change user status

Status description:

- Normal: User is in normal status, can do any non-overriding operations
- Disabled: User is in disabled status, cannot do any operations, including login

7.3.4 View User List

Supports paginated user list retrieval by conditions



The following are condition and pagination descriptions, each condition is optional:

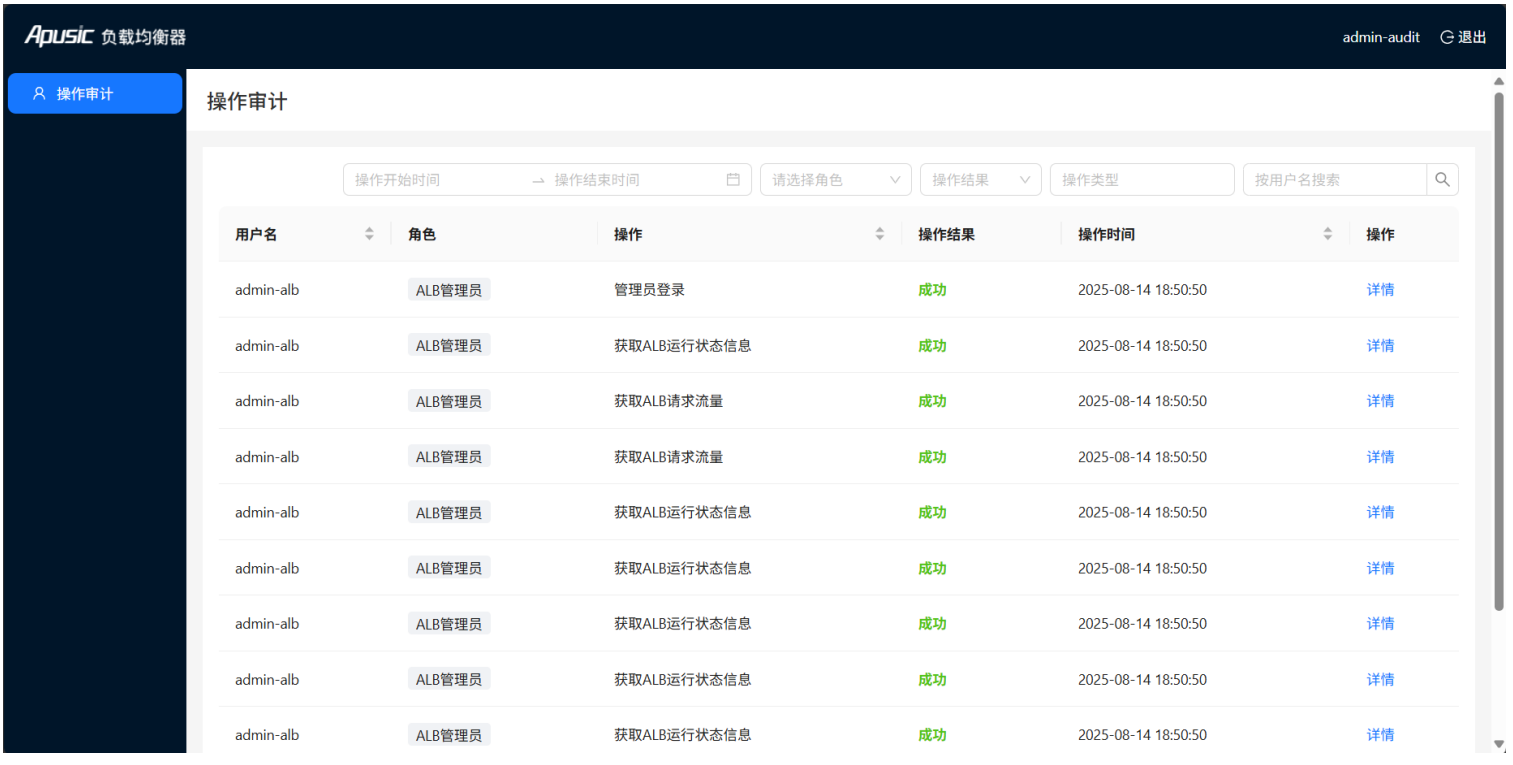
- Role: Can select the four roles provided by the system for filtering
- Time: Can filter by creation time and modification time
- Username: Can enter username in the search box for filtering, supports fuzzy matching
- User Status: Can select status for filtering
- Sort Field: Supports sorting by username, creation time, modification time, default is sorted by the order of user creation. Click username, creation time, modification time field to select descending or ascending order
- Sort Order: Supports ascending or descending order, default is ascending

7.3.5 View User Details

Select user, click "View" to view user details

7.4 Audit Administrator Operations

After the Audit Administrator logs in successfully, the default page is as follows:

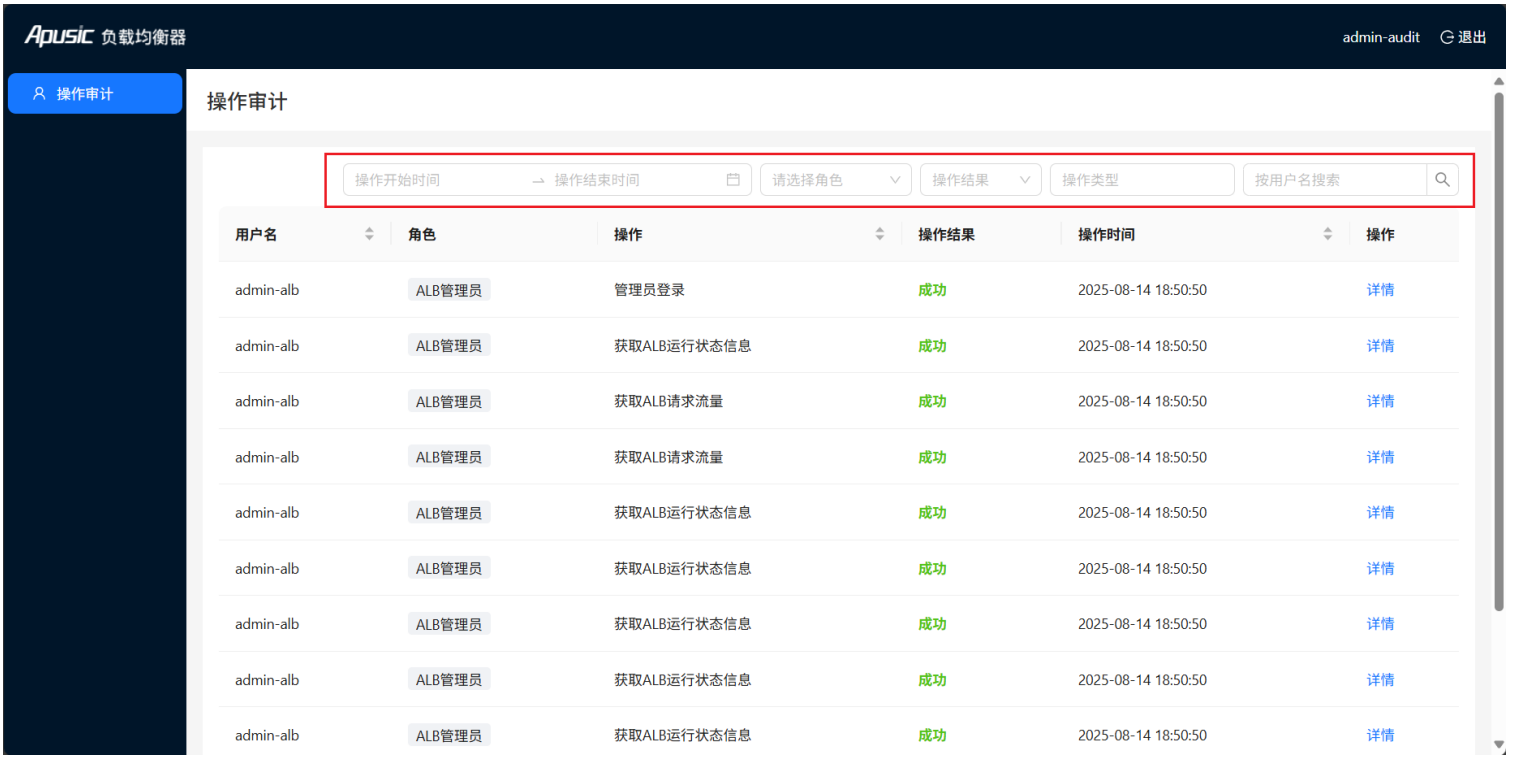


For each record, the following information is provided:

- Username: Indicates who performed this operation
- Role: Indicates the role of the operating user
- Operation: Indicates what operation the user performed
- Operation Result: Indicates whether the user operation was successful
- Operation Time: Indicates the time when the user performed the operation

7.4.1 View Operation Log List

Supports paginated operation log list retrieval by conditions

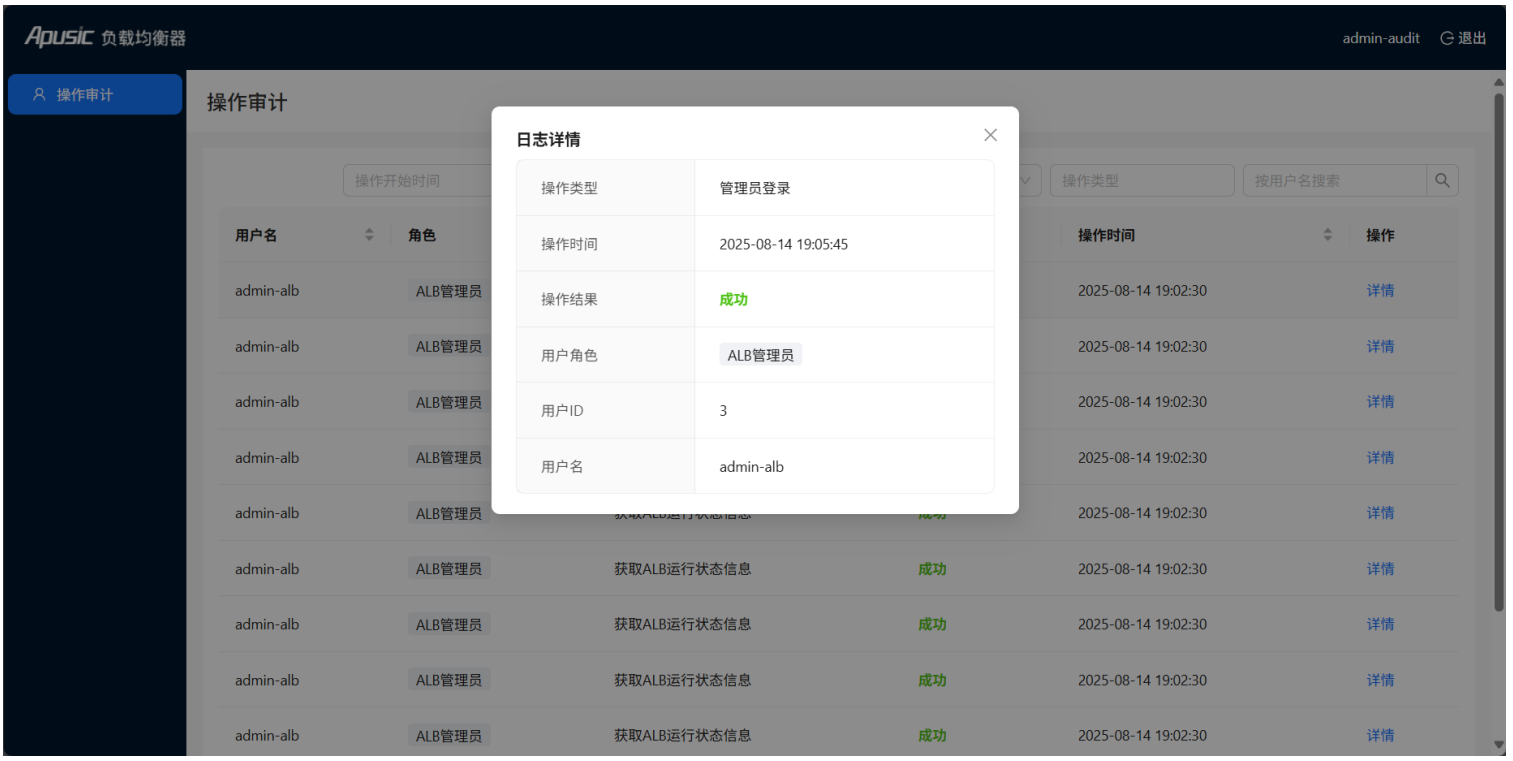


The following are condition and pagination descriptions, each condition is optional:

- Username: Can enter username in the username search box for filtering, supports fuzzy matching
- Role: Can select the four roles provided by the system for filtering
- Operation: Can enter operation keyword in the operation type search box for filtering, supports fuzzy matching
- Operation Result: Can select operation result for filtering
- Time: Can filter by operation time
- Sort Field: Supports sorting by username, operation, operation time, default is sorted by operation time
- Sort Order: Supports ascending or descending order, default is ascending

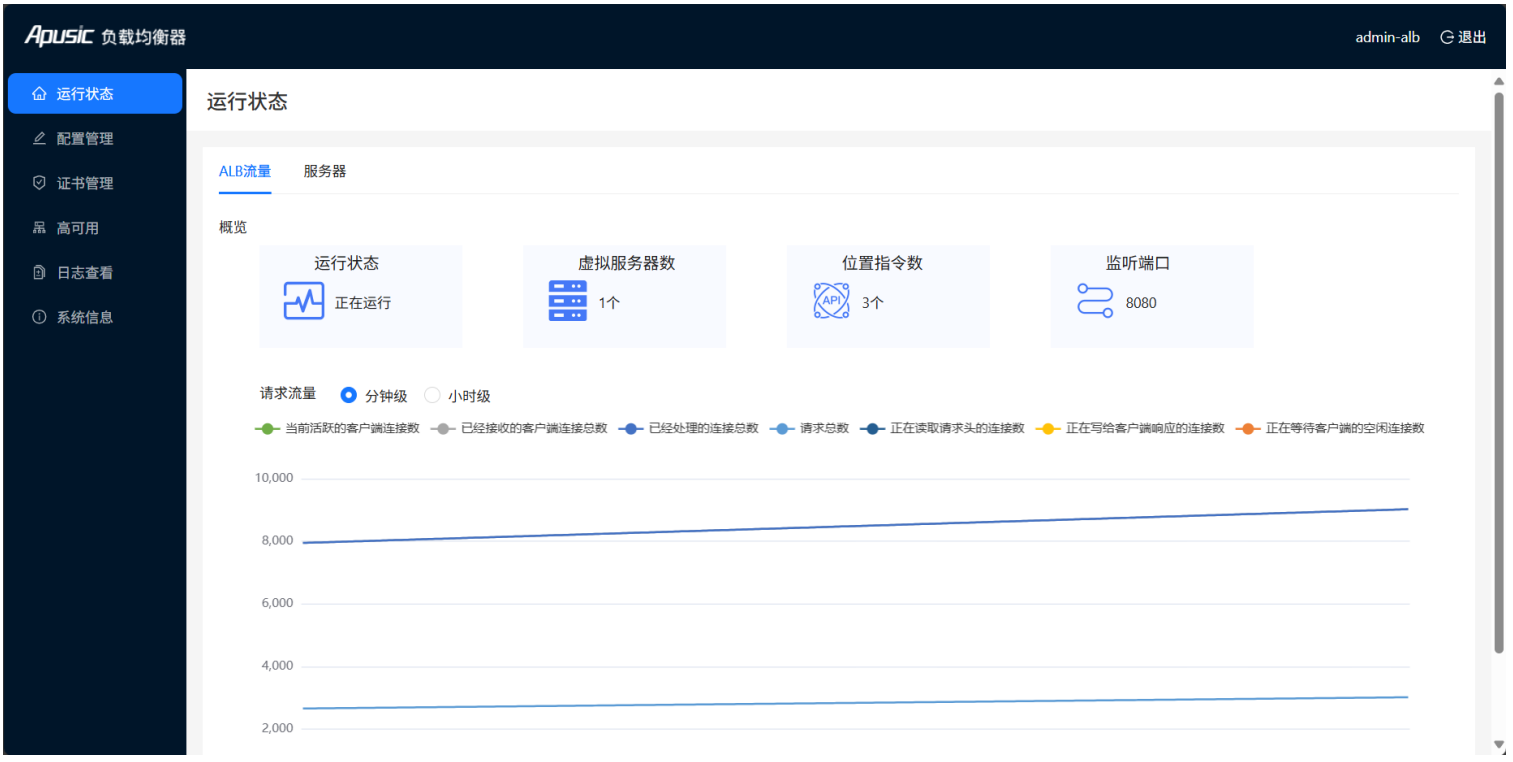
7.4.2 View Operation Log Details

Select log, click "View" to view log details



7.5 System Administrator Operations

After the System Administrator logs in successfully, the default page is as follows:



7.5.1 Running Status

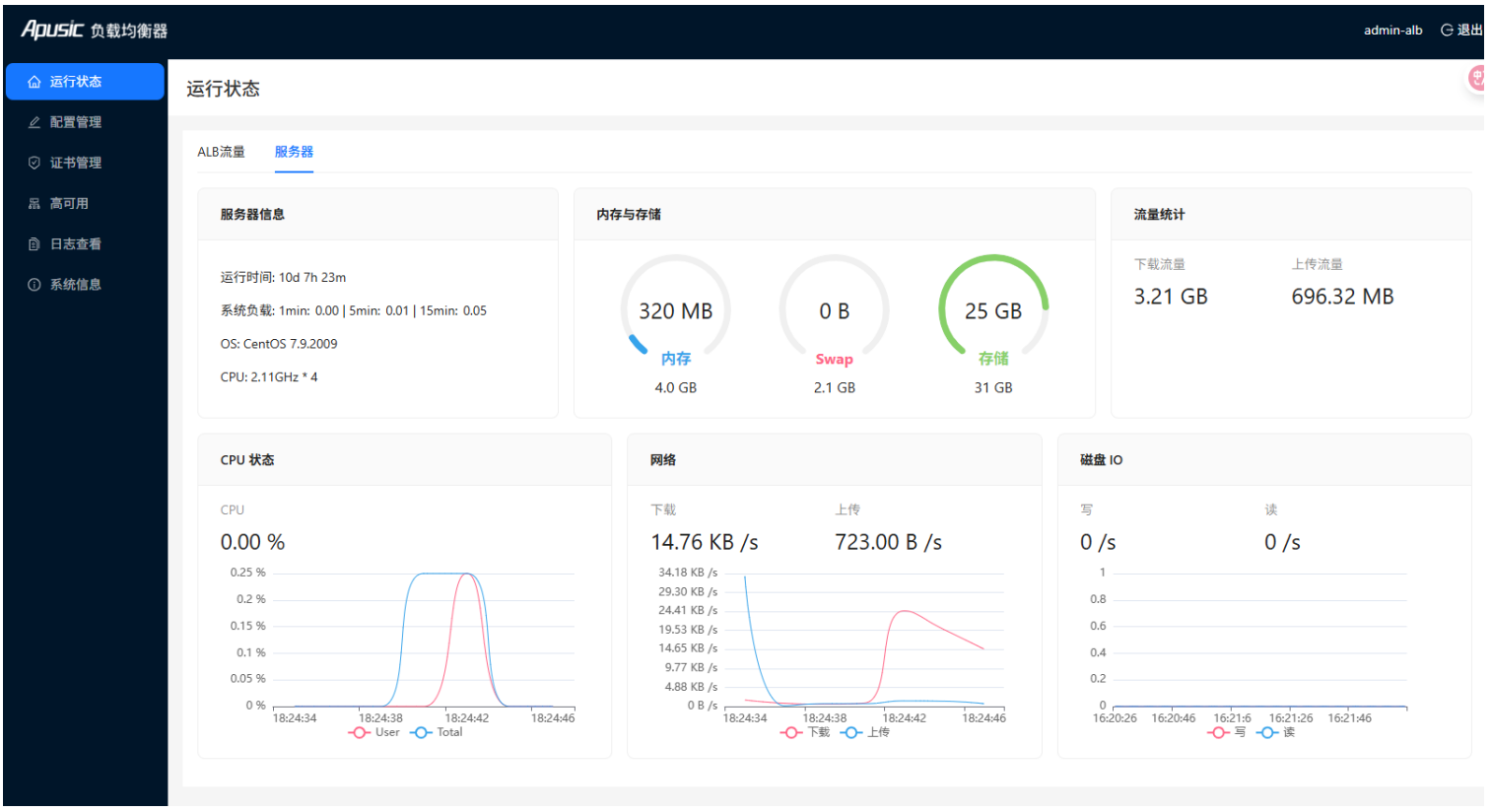
The running status page is the monitoring entry, you can monitor ALB traffic and node load conditions

Under the ALB traffic tab, you can monitor ALB node request data and virtual server information, as shown below:

Page information description:

- Running Status: Whether ALB is running
- Virtual Server Count: Total number of ALB virtual servers
- Location Directive Count: Total number of routing blocks in all virtual services
- Listening Ports: All ports that virtual services listen on
- Request Traffic: Display traffic trend in the form of line chart, supports viewing ALB traffic conditions by minute and hour, such as currently active client connections, processed connections, total requests, etc.

Under the server tab, you can monitor the load conditions of the node where ALB is deployed:



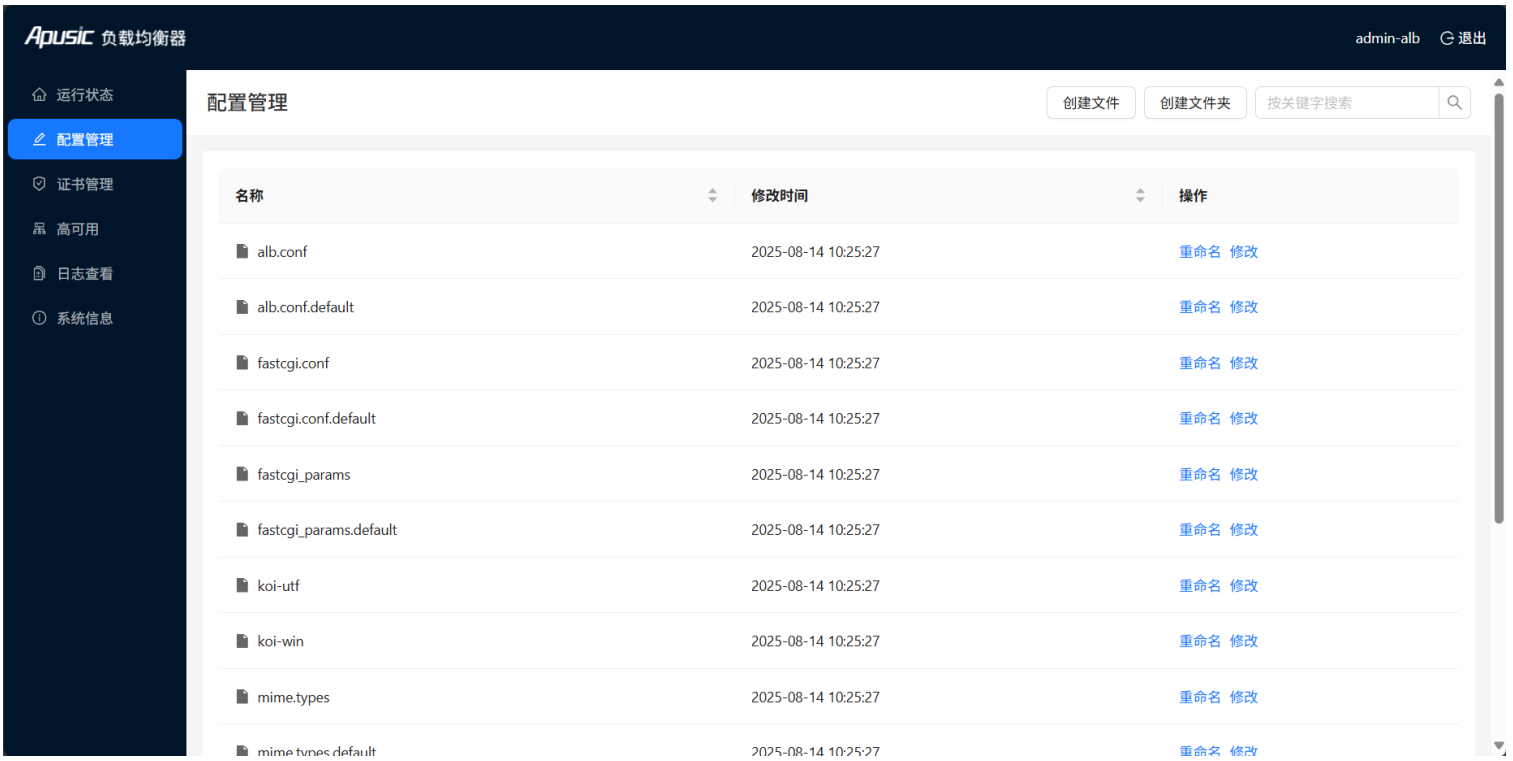
Page information description:

- Server Information: ALB running time, format is day/hour/minute; system load conditions; operating system platform identifier; CPU main frequency
- Memory and Storage: Memory size
- Traffic Statistics: Data sent by client to server (upload traffic) and data sent by server to client (download traffic)
- CPU Status: CPU usage rate
- Network: Network upload and download rates
- Disk IO: Disk IO rates

7.5.2 Configuration Management

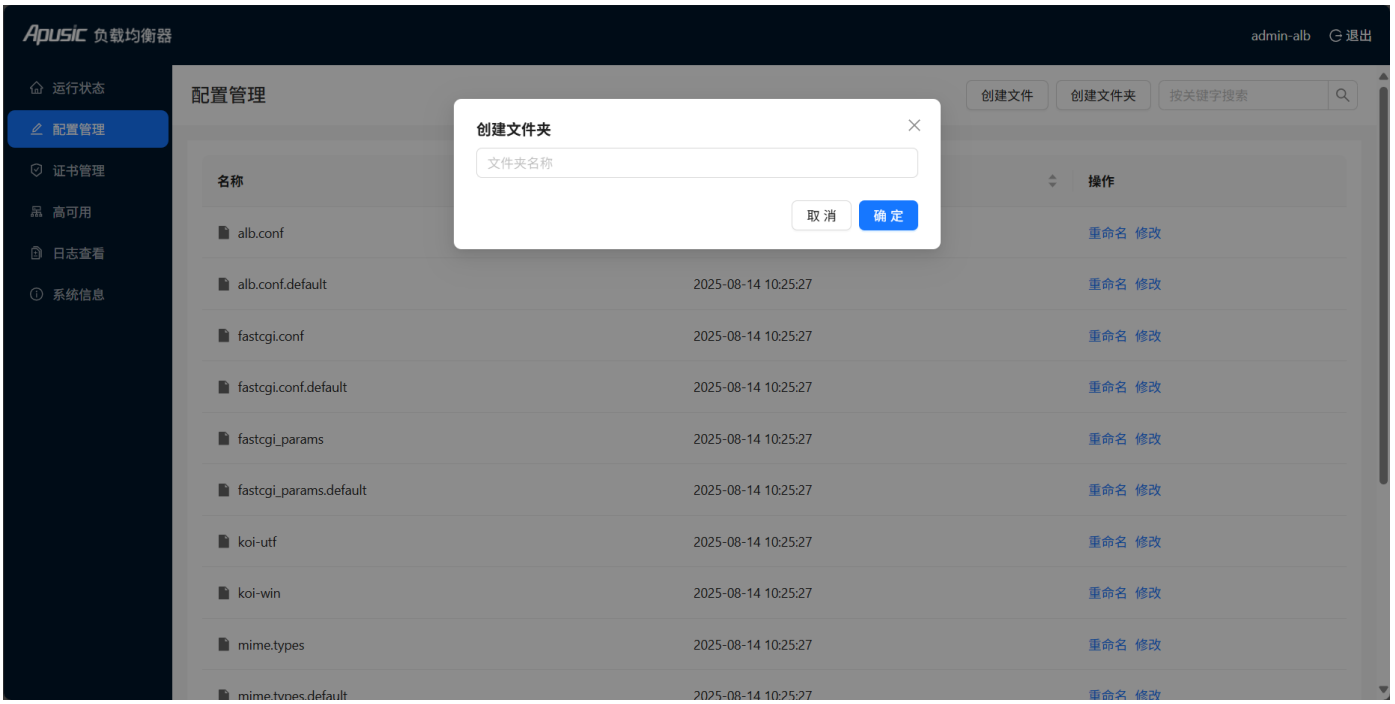
The configuration page is the entry for all ALB configuration management, managing all files in the conf folder under ALB installation directory

All files in the following page are default configuration files:

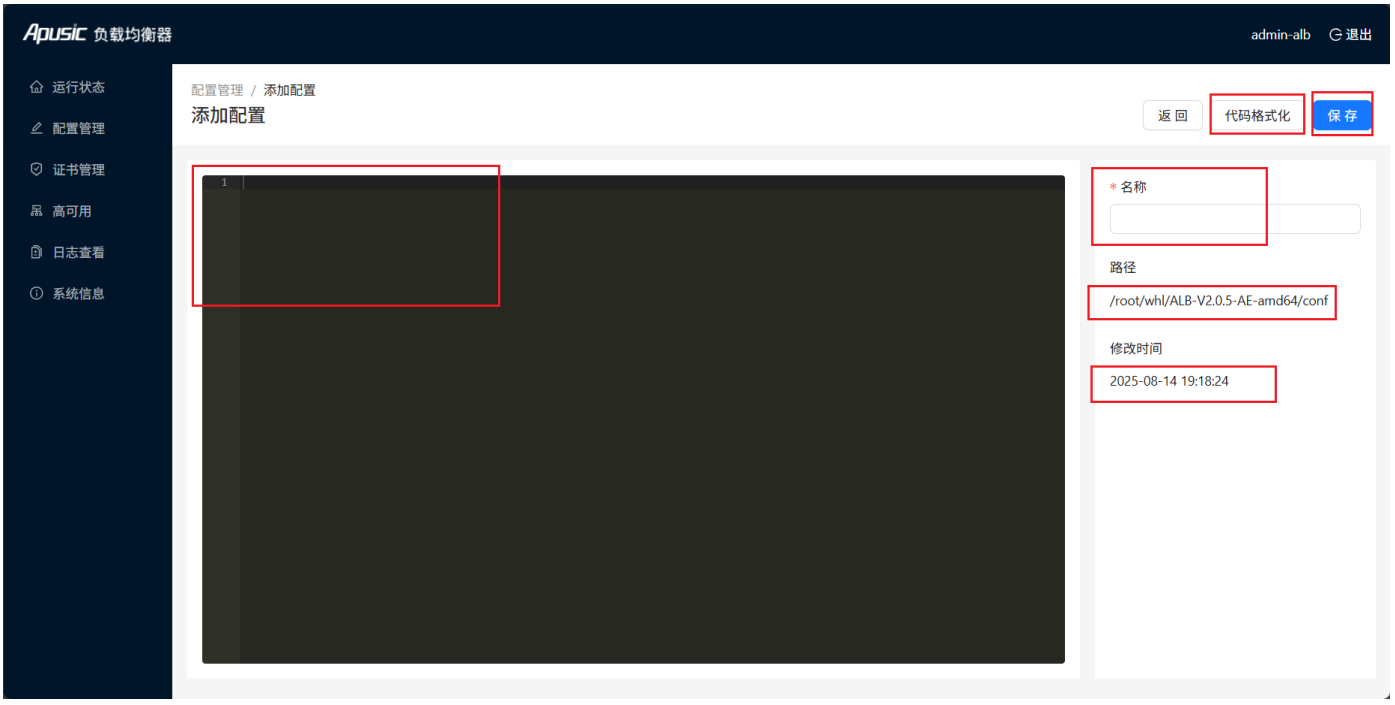


Page information description:

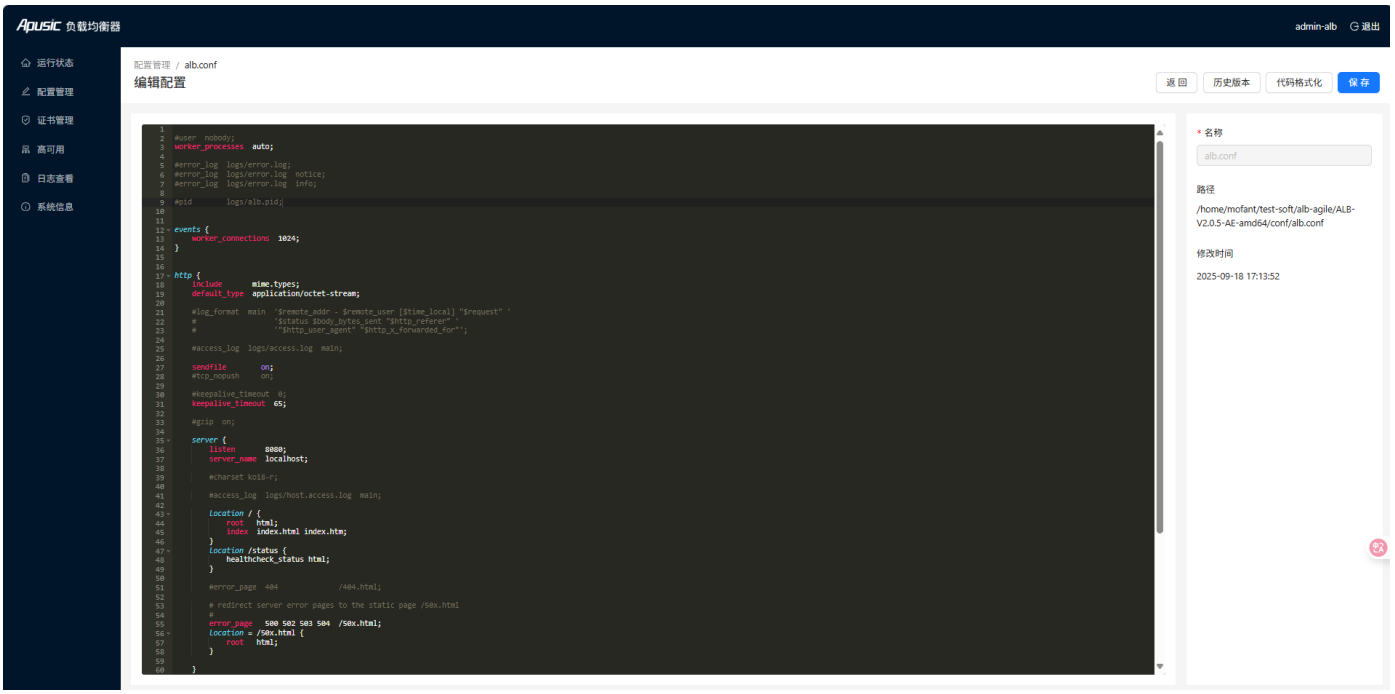
- Name: Configuration file name
- Modified Time: The time when the file was last modified
- Create Folder: Click "Create Folder" button to enter the following page to create a folder. File name naming rule is a string with length between 1~255, and the string cannot contain `\/:*?"<>|` characters, and ASCII control characters



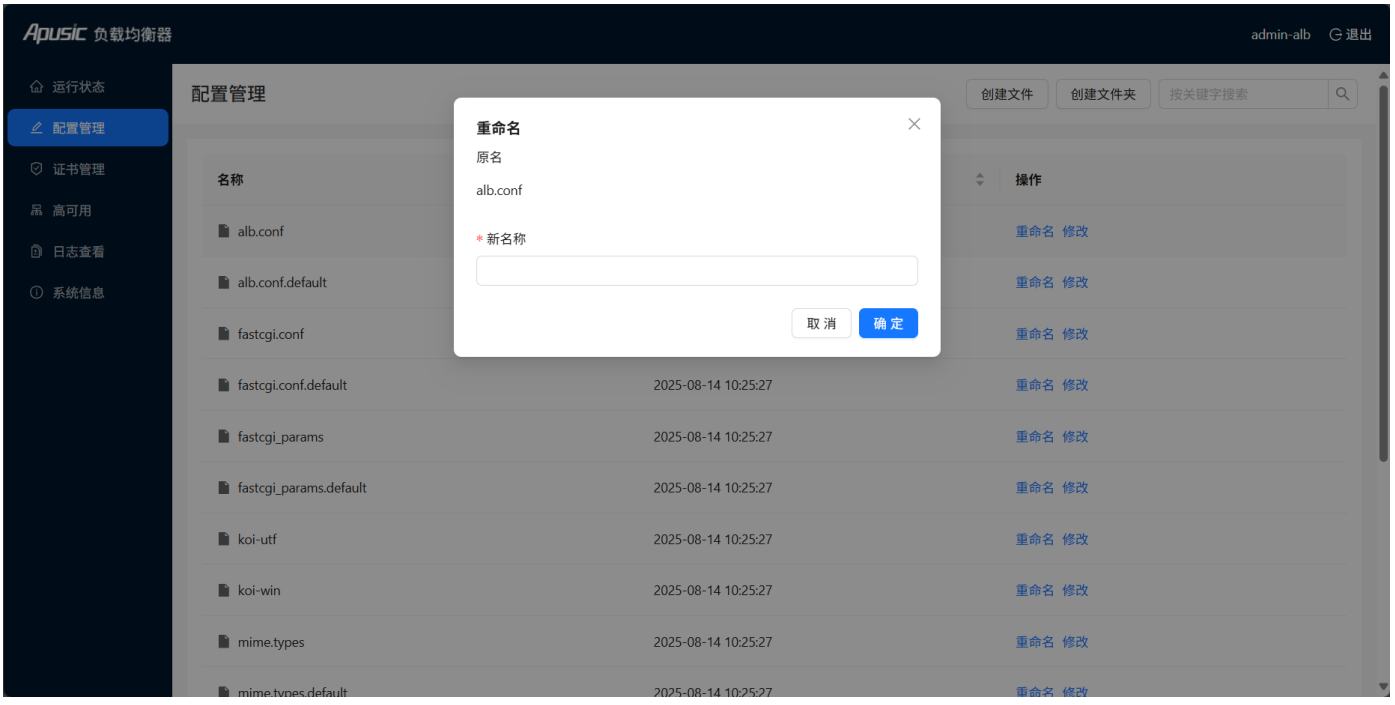
- Create File: Click "Create File" button to enter the following page, customize configuration file content and filename, click save to complete. File name naming rule is a string with length between 1~255, and the string cannot contain `\/:*?"<>|` characters, and ASCII control characters. The "Code Format" button in the page can format the file content. The page also shows the absolute path and modification time of the file. If the edited file content is not saved and you return, it will prompt accordingly



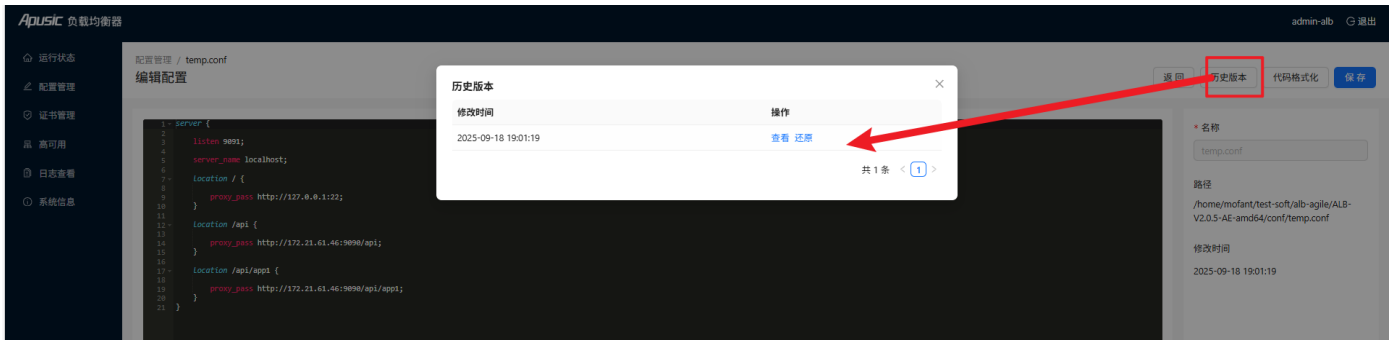
- Modify: Select the corresponding file and click "Modify" button to enter the following page, modify the configuration file content, click save to complete editing. If the file is not saved and you return directly, it will also prompt accordingly. The page also shows the file name, path and modification time



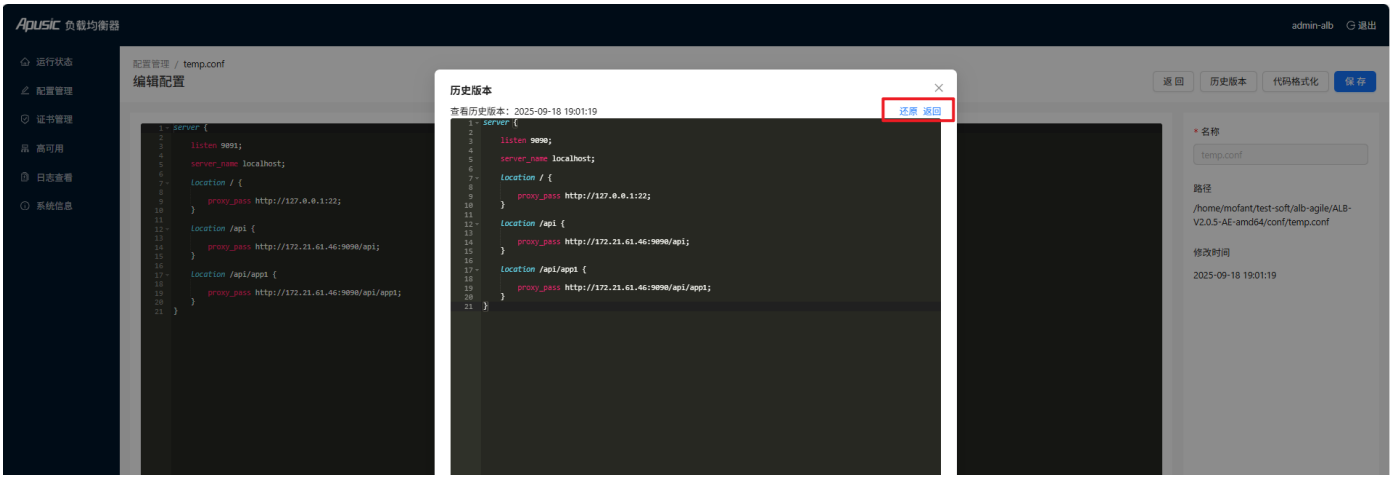
- Rename: Select the corresponding file and click "Rename" button to enter the following page, you can rename configuration file or folder, renaming also needs to follow the file naming rules



- History Version: Can view file modification history versions



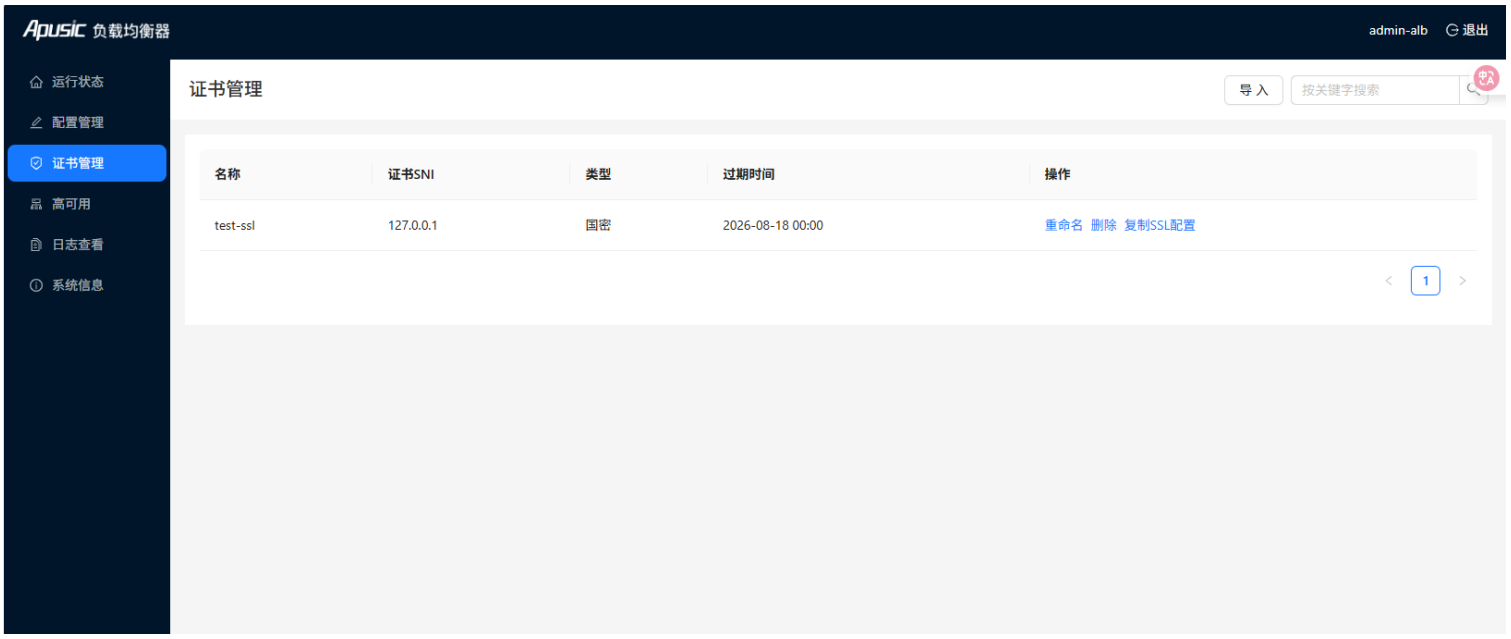
In the history version, you can click the view button to display the previous version's configuration content



After clicking the restore button, the old version configuration will be reverted to the edit area, after confirming it is correct, click Save button to restore the configuration.

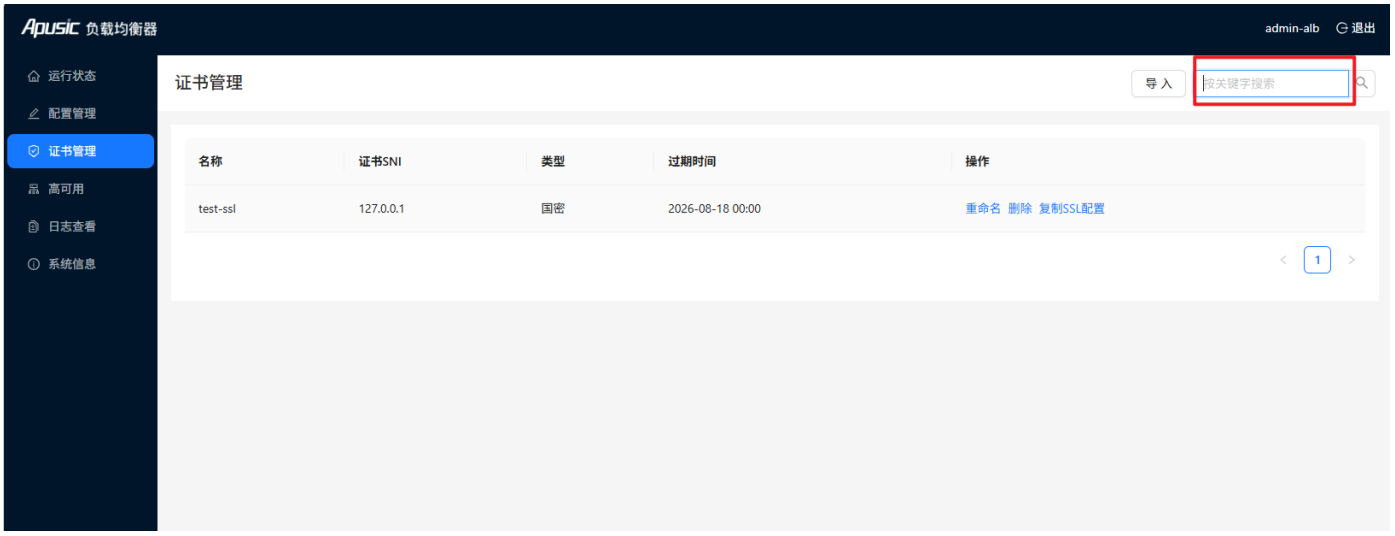
7.5.3 Certificate Management

The certificate management page is the entry for ALB to upload and manage SSL certificates, managing SSL certificate files

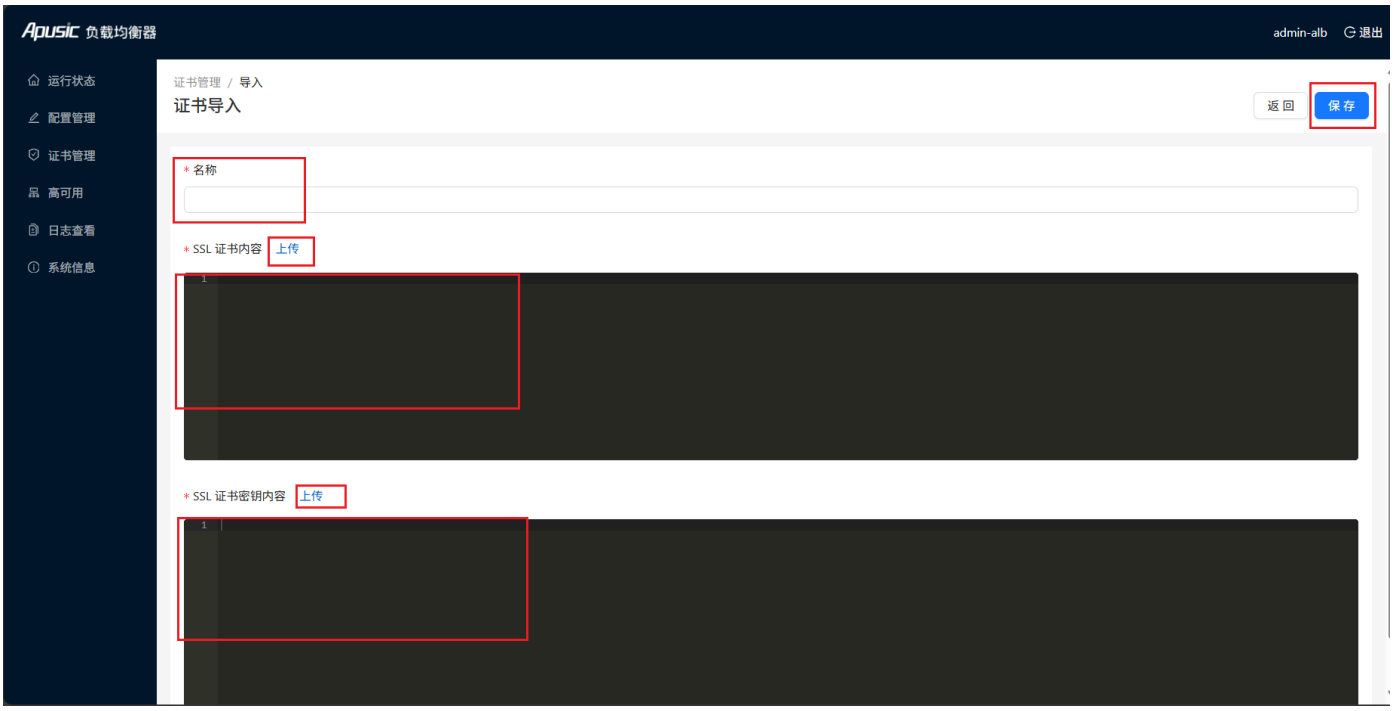


Page information description:

- Name: Certificate name, also the unique identifier of the certificate
- Certificate SNI: Identifies the server's domain name or IP address
- Type: Certificate type, including standard SSL certificate or Chinese national cryptography certificate
- Expiration Time: Certificate expiration date
- View Certificate List: Supports paginated certificate list retrieval by conditions, can enter certificate name in the search box for filtering, supports fuzzy matching

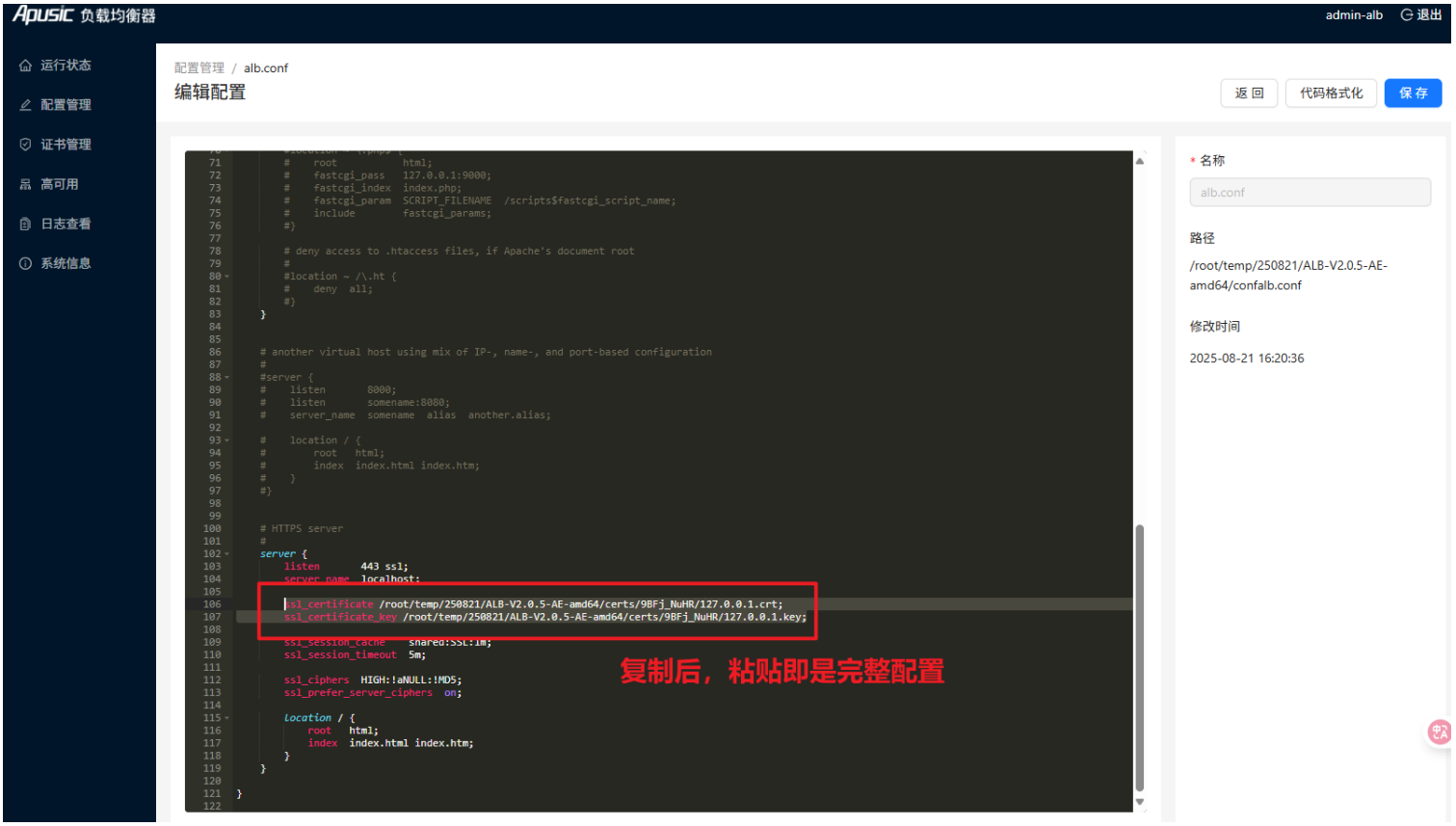


- Import: Click "Import" button to enter the following page, you can operate SSL certificate and key files, supports manual editing and local upload



7.5.3.1 Certificate Usage

In the uploaded certificates, click copy SSL configuration to directly paste and use in the configuration.



7.5.3.2 Chinese National Cryptography Certificate Import

Chinese National Cryptography Certificate needs to be imported twice with the following certificate content:

- 1. Server encryption certificate file and server encryption certificate private key file
- 2. Server signature certificate (required for Chinese national cryptography) and server signature certificate private key file (required for Chinese national cryptography)

That is, upload Chinese national cryptography certificate twice in the console before use, as shown in the figure below:

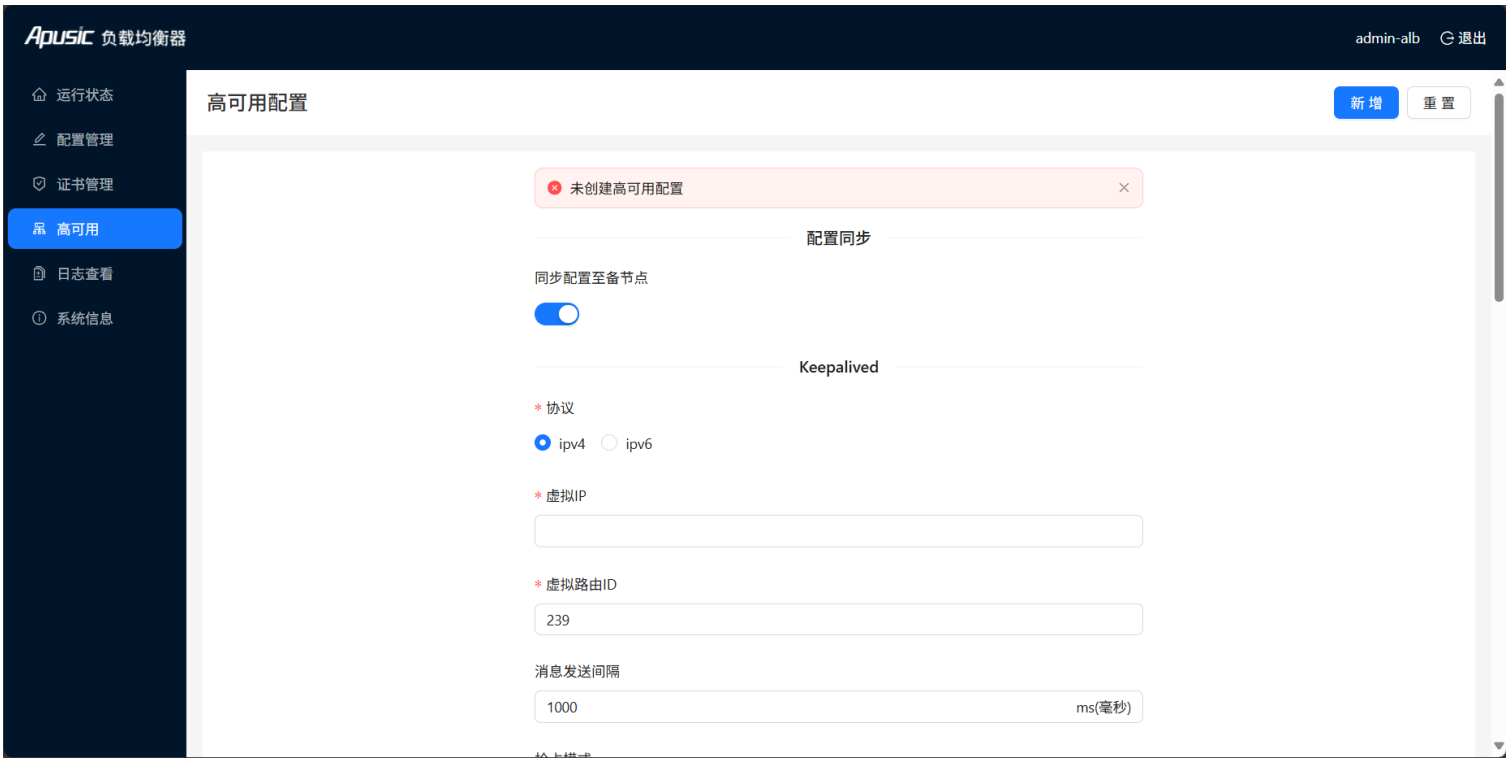
After uploading, in the corresponding server configuration block, you need to copy the SSL configuration twice and paste it into the configuration items, as shown in the figure below:

7.5.4 High Availability

The high availability page is the entry for viewing and configuring ALB high availability features. Only the master node can configure high availability, the backup node can only view. That is, when you configure high availability on the current node, the master node information in the configuration page can only select the current node IP by default. But if the master node's priority is lower than other backup nodes, when the configuration is complete, the master node will automatically switch, and the node with the highest priority becomes the master node

Note: To use high availability feature, the console must be started with root user.

If high availability is not configured, the page is as shown below:



Page information description:

- Configuration Sync: Indicates whether ALB configuration file changes are also synced to backup nodes, that is, whether all operations on files in configuration management are synced to backup nodes
- Keepalived: Used to implement VIP (Virtual IP) failover and load balancing, the following are the specific meanings of each item:
    - Protocol: Indicates whether virtual IP runs in IPv4 or IPv6 network, and also determines the type of virtual IP
    - Virtual IP: A dynamic IP, the entry IP of the active-standby node cluster, used to provide services externally, it can dynamically switch between active and backup nodes
    - Virtual Router ID: Used to identify active and standby nodes in the high availability cluster, nodes in the same cluster must have the same ID
    - Message Send Interval: Indicates the time interval for the master node to send heartbeat messages to backup nodes
    - Preemption Mode: Indicates whether to allow high priority nodes to re-take over the virtual IP after recovery
- Health Check: Used to check whether the ALB service running status is normal
    - Check Type: Can select the communication protocol during checking, supports http or https
    - Check Port: Indicates the port of the node's health check service, value range: 1~65535, default 8080

- Check URL: Indicates the URL of the node's health check service, cannot start with /, default node_status, recommended to configure as the business entry URL address.
- Health Status Code: Indicates that when the health check returns this status code, it is considered a healthy status, supports manual addition and deletion, value range: 100~599, default 200, 404
- Check Interval: Indicates the time interval between two health checks, default is 1 second, supports manual adjustment
- Retry Count: Indicates the maximum number of retries allowed when health check fails, default is 3, prevents network jitter from causing misjudgment, improves fault tolerance, supports manual modification
- Retry Interval: Indicates the time interval for each retry when health check fails, default is 2 seconds, supports manual modification
- Whether to restart alb when alb is detected unhealthy: When a node is marked as unhealthy, whether to restart ALB

- Master/Backup Nodes
  - IP: The IP address of the ALB deployment node, the node deploying high availability configuration is the master node by default (will automatically transfer based on priority after configuration is complete), master node IP defaults to the current node IP, just select directly, backup node needs to be entered manually
  - Network Interface: The network interface the IP address belongs to, no need to enter manually, will be automatically obtained after entering the IP, then just select, backup node needs to click "Test Connection" to automatically fill in
  - Console Port: ALB console service port on the ALB deployment node, default 8887
  - Priority: The priority of master and backup nodes, used to determine which node is promoted to master node, the larger the number, the higher the priority, maximum value is 255
  - AuthKey: Authentication when master and backup nodes communicate, prevents unauthorized nodes from joining the cluster, and ensures the security of inter-node communication. AuthKey value is in the node configuration file: `ALB installation directory/console/conf/config.yaml` alb: `aha-auth-key` field.

    - Test Connection: When the backup node configuration is complete, clicking "Test Connection" will test whether the backup node is reachable, and get the network interface information corresponding to the IP

- New: After entering relevant configuration information in the page, click "New" button to create high availability configuration (provided that ALB product is in normal startup status), prompting save success means creating high availability configuration successfully. After creating configuration successfully, high availability feature will be enabled by default. After successful configuration, a status information bar will be added at the top of the page, as shown below and information description:

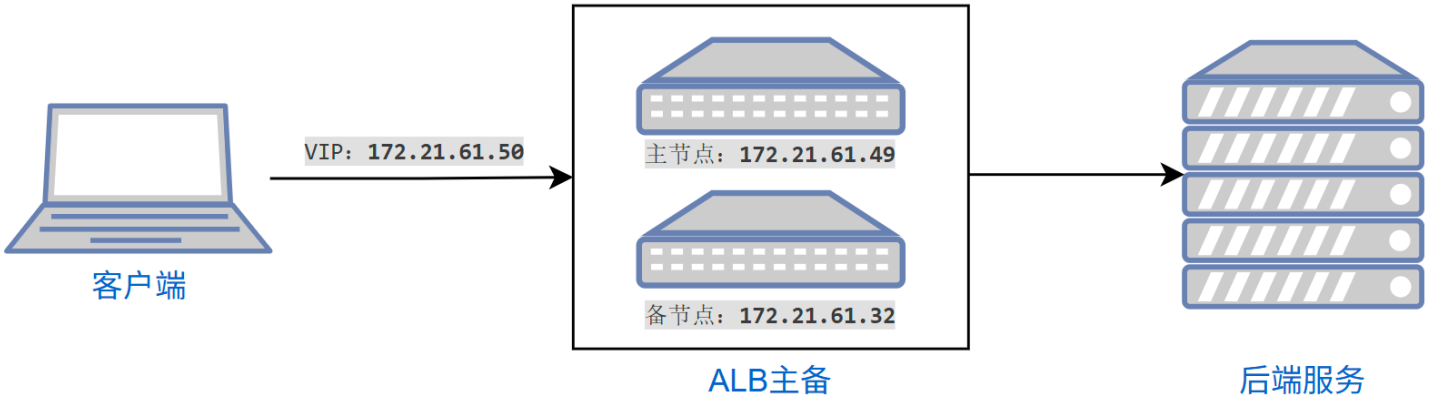
    - Current Node Role: Indicates whether the current node is master or backup node
    - VIP Binding Status: Indicates whether VIP (Virtual IP) is successfully bound, if high availability service starts normally but VIP binding status shows unbound, please refresh the page a few times
    - High Availability Status: Indicates whether high availability is enabled, can manually select to enable or disable

- Modify: Click "Modify" button to modify the high availability configuration in the page, "Modify" button will only appear after successfully creating high availability configuration

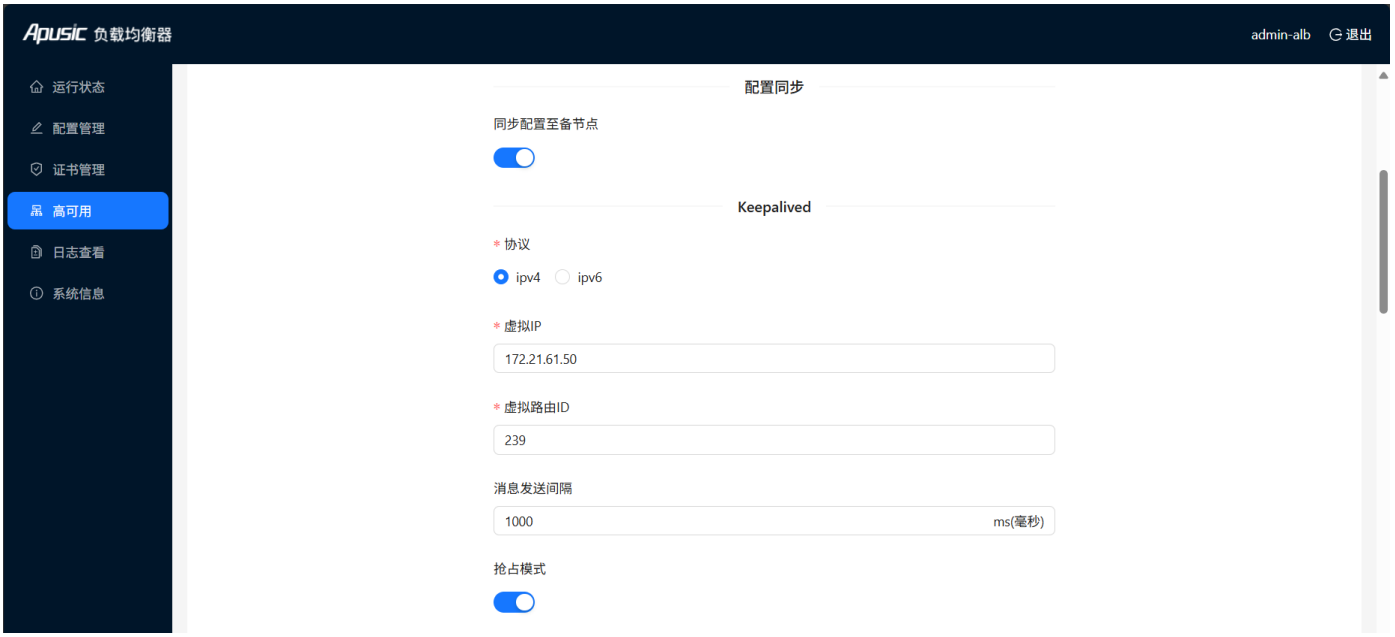
- Reset: Click "Reset" button to reset high availability configuration, equivalent to directly deleting high availability configuration and disabling high availability feature

7.5.4.1 Create Active-Standby High Availability

As shown in the figure below, create active-standby ALB high availability environment:



- High Availability Cluster Information
  - Master Node: 172.21.61.49
  - Backup Node: 172.21.61.32
  - Virtual IP: 172.21.61.50
- Keepalived Configuration

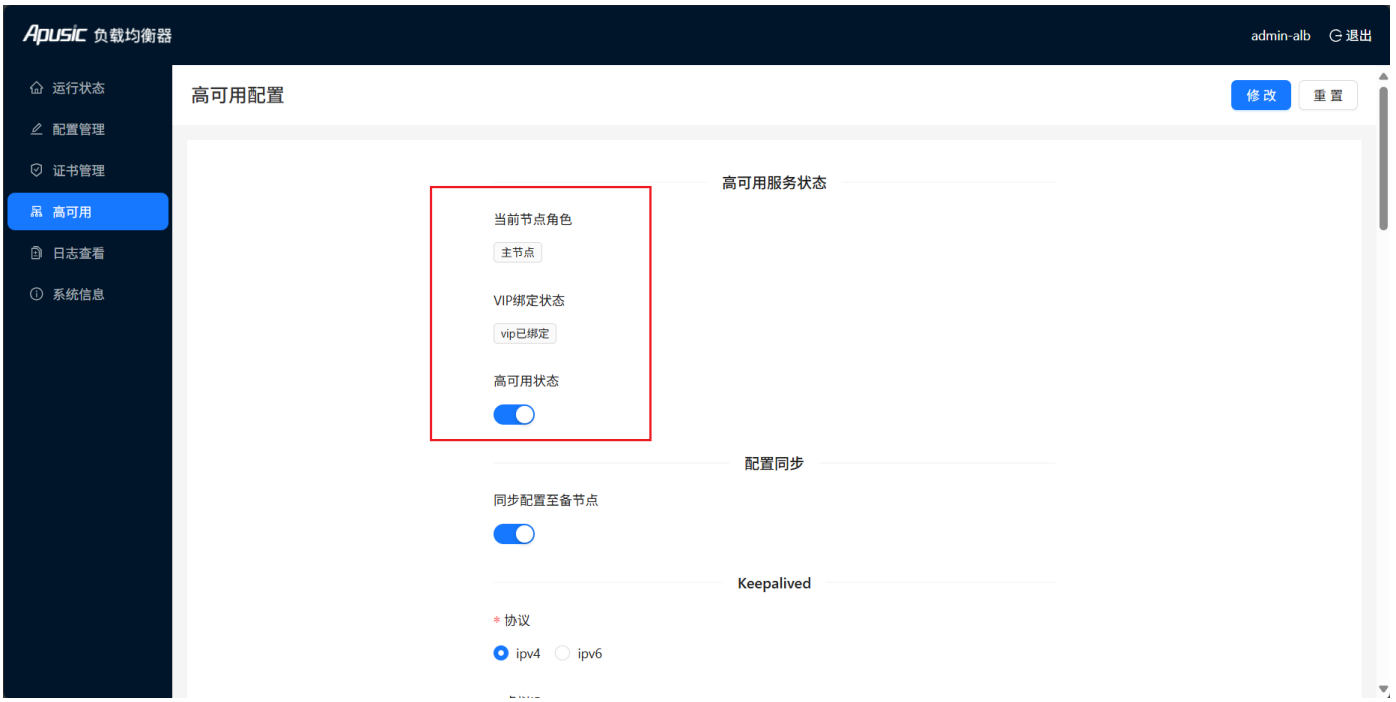


- Master Node Configuration

- Backup Node Configuration

After clicking "Create" button and successful configuration, master and backup nodes display as follows:

- Master Node



- Backup Node

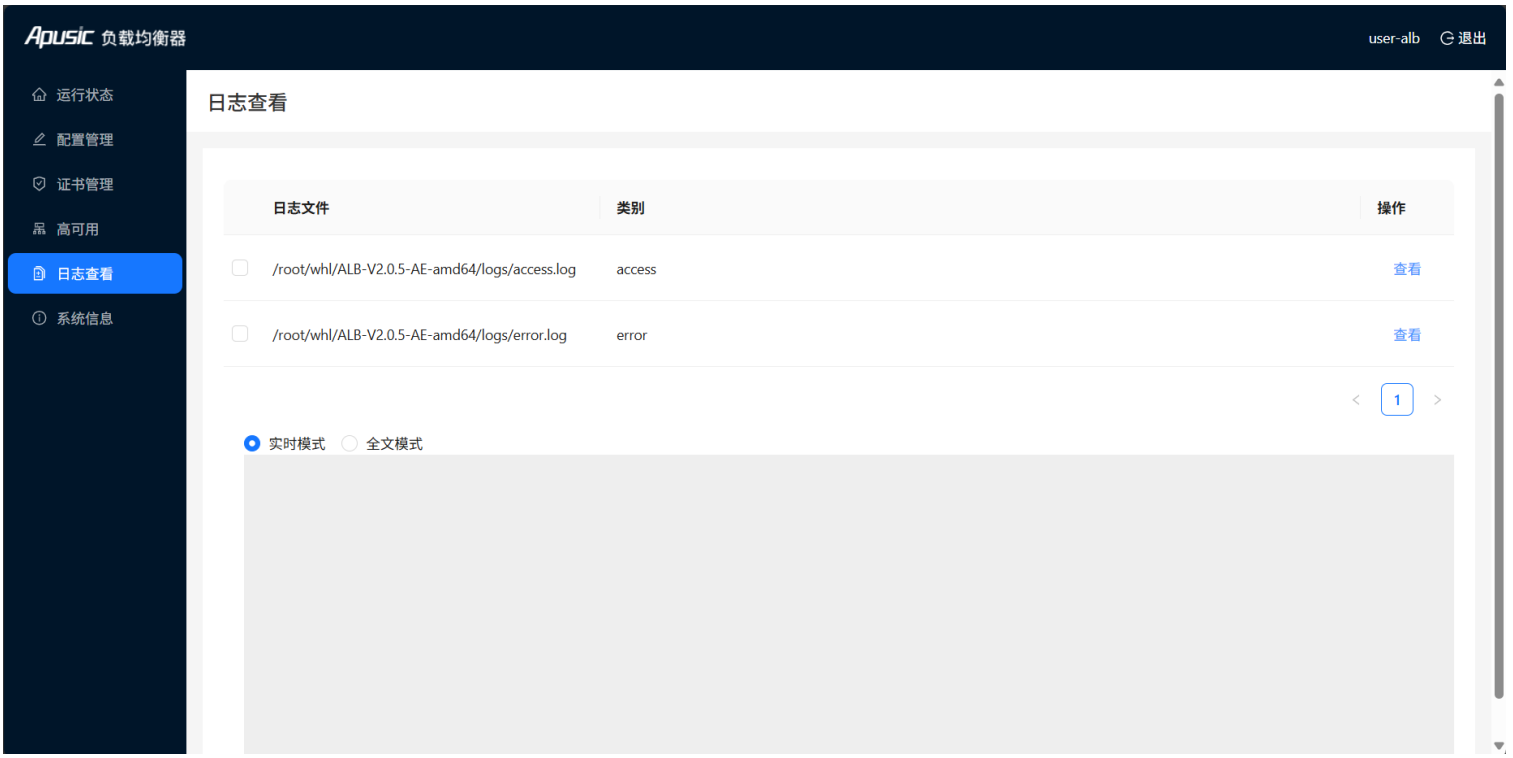
When I adjust the priority of master node `172.21.61.49` to 10 and click "Modify" button, the master node becomes backup node, backup node `172.21.61.32` becomes master node

- Adjust master node `172.21.61.49` priority to 10

- Active-standby switchover

7.5.5 Log Viewing

The log viewing page is the entry for viewing ALB access logs and error logs

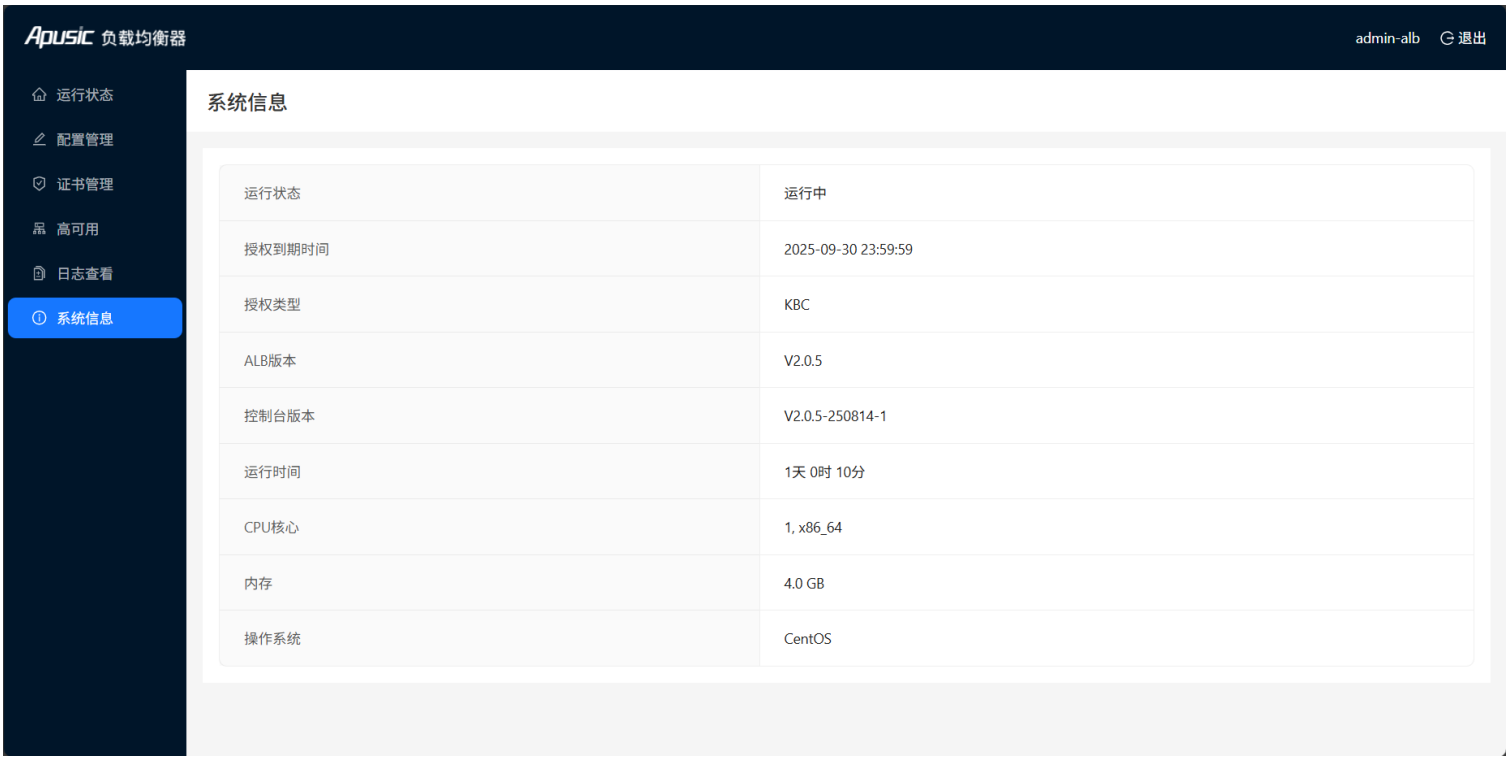


Page information description:

- Log List: Collection of all log files in ALB configuration
  - Log File: Name of the log file
  - Category: Type of log file, one is access log, one is error log. Access log records detailed information of all client requests, error log records errors or warnings that occur during operation
- View: Click view button to view log file content, default is real-time mode.
- Real-time Mode: Real-time get the latest data of the selected log.
- Full Text Mode: Get the complete data of the selected log, but maximum 10MB log content can be retrieved.

7.5.6 System Information

The system information page can view ALB running information, version information, and deployed node information



Page information description:

- Running Status: Whether ALB is running
- License: License expiration time
- Type: License type
- ALB Version: ALB version
- Console Version: ALB console version
- Running Time: ALB running time
- CPU Cores: CPU core count and architecture of the node where ALB console service is located
- Memory Size: Memory size of the node where ALB console service is located
- Operating System: Operating system identifier of the node where ALB console service is located

7.6 Regular User Operations

After the Regular User logs in successfully, the default page is as follows:

Regular users see the same information as system administrators, the only difference is that administrators have operation permissions, while regular users only have view permissions

7.7 Enable/Disable Forced User Password Modification

ALB console users must modify password on first login. The way to enable/disable this feature is in `ALB installation directory/console/conf/config.yaml` file:

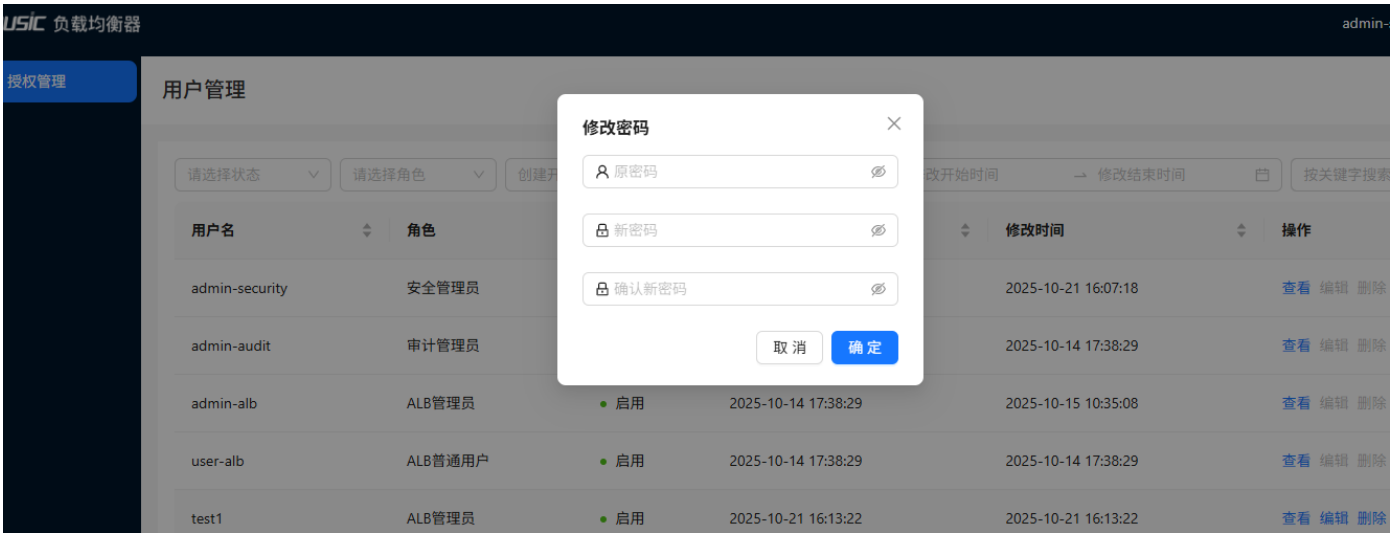
```
system:
  # Whether to force first login password modification, default is forced
  change-pwd-at-first: true
```

First login will prompt to modify password, only after modifying password can you log in.

7.8 User Password Modification

There are two ways to modify user password:

- Security administrator logs in to management backend, edits user information, can directly modify password.
- User logs in to the system, clicks on their username to pop up a dialog to modify.



7.9 User Password Reset

User password reset can be done by logging into the ALB installation directory and executing:

`./alb-standard-V2.0.5-console --reinit username` Where username is the default user whose password needs to be reset. The following resets admin-alb user password

```
cd console
./alb-standard-V2.0.5-console --reinit admin-alb
[alb-standard-console]2025/10/09 - 17:16:20.467    info
/home/mofant/work/alb-agile/alb-lightweight-console-
be/initialize/sqlite.go:52  register table success
[alb-standard-console]2025/10/09 - 17:16:20.489    info
/home/mofant/work/alb-agile/alb-lightweight-console-
be/initialize/sqlite.go:138 User password reset successful, please
login with new password  {"username": "admin-alb"}
```

7.10 Reset Console

If you need to reset ALB console, you can do the following operations:

- Log in to the system using terminal, switch to alb installation directory
- Stop ALB
- Delete `console/data/alb.db` file
- Start ALB
- Log in again

Note: If you don't want to stop ALB service, you can separately find the process named: `alb-standard-V2.0.5-console` , and kill -9 process ID, then delete `ALB installation directory/console/data/alb.db` file, then switch to `console` directory, then use `nohup ./alb-standard-V2.0.5-console > console.log 2>&1 &` to start ALB service

8 User Scenario Configuration Cases

8.1 Overview

ALB is not only a Web server, but also a "traffic hub" in modern application architecture. It plays a key role in high concurrency, security protection, service governance, etc. This document explains in detail how enterprises can use ALB to solve practical problems at different development stages through multiple scenarios close to real business, with reusable configuration samples and effect analysis.

8.2 Scenario 1: Frontend Single Page Application Hosting and Routing Support/Static Resource Publishing

8.2.1 1. Background

A company uses React to develop management backend, outputting static resources after building. Initially, static services were provided through Node.js Express, deployed on a single cloud server.

8.2.2 2. Problems Encountered and Problems to be Solved

- When users directly access non-root paths like /settings, they get 404 (because the server has no corresponding physical file);
- Static resources are not cached, downloaded again every refresh, high bandwidth cost, slow loading;
- Express CPU usage spikes when concurrency > 500, response latency exceeds 2 seconds.

Problems to be solved: Implement SPA routing compatibility, efficient static resource distribution, reduce server load.

8.2.3 3. ALB Function and Configuration Matching with Problems

- `try_files` directive: Implement frontend routing fallback to index.html;
- `expires` and `add_header` : Set long-term cache policy;
- ALB high-performance event-driven model: Efficiently handle static file requests.

8.2.4 4. Configuration and Details Using ALB to Solve This Scenario

```
server {
    listen 80;
    server_name test.com;

    root /var/www/admin/dist;
```

```
    index index.html;

    # SPA routing support: if file doesn't exist, fallback to
index.html
    location / {
        try_files $uri $uri/ /index.html;
    }

    # Static resources set 1 year cache (immutable)
    location ~* \.(js|css|png|jpg|svg|woff2)$ {
        expires 1y;
        add_header Cache-Control "public, immutable";
    }
}
```

- `try_files $uri $uri/ /index.html` : First look for physical file, if not found, hand over to frontend routing;
- `immutable` cache: Browser will never initiate conditional requests during cache validity period, greatly improving revisit speed.

8.2.5 5. Effect, Before and After Comparison

Metric	Before (Express)	After (ALB)
First screen load time	2.1s	0.6s
Static resource QPS	300	5000+
CPU usage (500 concurrent)	85%	12%
Routing 404 errors	Frequent occurrence	Completely eliminated

8.3 Scenario 2: Microservice API Unified Entry and Load Balancing

8.3.1 1. Background

An e-commerce platform completed microservice split, with user, order, payment three core services, deployed on different hosts or containers respectively.

8.3.2 2. Problems Encountered and Problems to be Solved

- Clients need to maintain multiple service addresses, complex calls;
- When an instance goes down, it cannot be automatically removed, causing request failures;
- Lack of unified logs, difficult to troubleshoot problems.

Problems to be solved: Unified API entry, automatic load balancing, centralized observability.

8.3.3 3. ALB Function and Configuration Matching with Problems

- `upstream` + `server` : Define backend cluster;
- `proxy_pass` : Reverse proxy to corresponding service;
- `max_fails/fail_timeout` : Health check mechanism;
- `access_log` : Unified request logging.

8.3.4 4. Configuration and Details Using ALB to Solve This Scenario

```
upstream user_backend {
    server 10.0.1.10:8080 max_fails=3 fail_timeout=30s;
    server 10.0.1.11:8080 max_fails=3 fail_timeout=30s;
}

upstream order_backend {
    server 10.0.1.10:8080 max_fails=3 fail_timeout=30s;
    server 10.0.1.11:8080 max_fails=3 fail_timeout=30s;
}

upstream payment_backend {
    server 10.0.1.10:8080 max_fails=3 fail_timeout=30s;
    server 10.0.1.11:8080 max_fails=3 fail_timeout=30s;
}

server {
    listen 80;
    server_name api.shop.com;

    access_log /var/log/alb/api.log combined;

    location /api/users/ {
        proxy_pass http://user_backend/;
```

```
        proxy_set_header Host $host;
        proxy_set_header X-Real-IP $remote_addr;
    }

    location /api/orders/ {
        proxy_pass http://order_backend/;
        proxy_set_header Host $host;
        proxy_set_header X-Real-IP $remote_addr;
    }

    location /api/payment/ {
        proxy_pass http://payment_backend/;
        proxy_set_header Host $host;
        proxy_set_header X-Real-IP $remote_addr;
    }
}
```

- `max_fails=3` : After 3 consecutive failures, no more requests will be forwarded to that node within 30 seconds;
- `X-Real-IP` : Pass through real client IP for backend audit.

8.3.5 5. Effect, Before and After Comparison

- Client call addresses reduced from 3 to 1;
- When service instance fails, error rate drops from 15% to 0.2%;
- Operations can track all API call chains through a single log file.

8.4 Scenario 3: Full Site HTTPS Forced Redirect and SSL Termination

8.4.1 1. Background

An online education platform must enable HTTPS due to GDPR compliance requirements. Currently both HTTP and HTTPS are open, certificates are managed by Java application.

8.4.2 2. Problems Encountered and Problems to be Solved

- Users may access through HTTP, posing data leakage risk;
- Backend application handles SSL encryption/decryption, high CPU overhead;
- Certificate update requires application restart, affecting availability.

Problems to be solved: Force HTTPS, SSL edge termination, zero downtime certificate update.

8.4.3 3. ALB Function and Configuration Matching with Problems

- return 301: HTTP forced redirect to HTTPS;
- ssl_certificate: Load TLS certificate;
- Supports hot reload (./bin/reload-alb.sh), no connection interruption needed.

8.4.4 4. Configuration and Details Using ALB to Solve This Scenario

```
server {
    listen 80;
    server_name learn.edu.com;
    return 301 https://$host$request_uri;  # Forced redirect
}

upstream backend {
    server 10.0.1.10:8080 max_fails=3 fail_timeout=30s;
    server 10.0.1.11:8080 max_fails=3 fail_timeout=30s;
}
server {
    listen 443 ssl http2;
    server_name learn.edu.com;

    ssl_certificate /opt/ALB-2.0.2-SE-
amd64/conf/learn.edu.com/fullchain.pem;
    ssl_certificate_key /opt/ALB-2.0.2-SE-
amd64/conf/learn.edu.com/privkey.pem;

    ssl_protocols TLSv1.2 TLSv1.3;
    ssl_ciphers HIGH:!aNULL:!MD5;  # Use more secure encryption
algorithms

    location / {
        proxy_pass http://backend/;
        proxy_set_header X-Forwarded-Proto $scheme;  # Tell backend
original protocol
```

```
    }
}
```

8.4.5 5. Effect, Before and After Comparison

- HTTP traffic ratio drops from 40% to 0%;
- Backend CPU load drops 18%;
- Certificate update only needs to replace file and reload, zero service interruption.

8.5 Scenario 4: API Interface Anti-Scraping and Rate Limiting

8.5.1 1. Background

A social platform opened user information query interface /api/profile/{id}, recently encountered crawler high-frequency requests.

8.5.2 2. Problems Encountered and Problems to be Solved

- Database QPS surged from 2000 to 15000, response timeout;
- Normal user requests were blocked;
- Temporary IP blocking affected legitimate developers.

Problems to be solved: Quickly implement rate limiting without modifying business code.

8.5.3 3. ALB Function and Configuration Matching with Problems

- `limit_req_zone` : Define rate limit zone based on IP;
- `limit_req` : Apply rate limiting policy in location;
- `burst + nodelay` : Allow burst traffic smooth processing.

8.5.4 4. Configuration and Details Using ALB to Solve This Scenario

```
http {
    limit_req_zone $binary_remote_addr zone=profile_limit:10m
rate=5r/s;

    server {
        location = /api/profile {
            limit_req zone=profile_limit burst=10 nodelay;
            limit_req_status 429;
            proxy_pass http://user_service;
```

```
        }
    }
}
```

- `rate=5r/s` : Maximum 5 requests per second;
- `burst=10` : Allow instantaneous burst of 10 requests, avoiding normal user false positives;
- Returns 429 status code, compliant with RESTful specification.

8.5.5 5. Effect, Before and After Comparison

- Malicious request blocking rate 99.6%;
- Database QPS falls back to 2200;
- Normal users unaware, developers can implement retry logic based on 429.

8.6 Scenario 5: Dynamic and Static Separation and Dynamic Content Caching

8.6.1 1. Background

Video platform course detail page contains dynamic data (learning progress, comments), but is frequently accessed.

8.6.2 2. Problems Encountered and Problems to be Solved

- Every request penetrates to Java backend, even if content hasn't changed;
- Redis caching strategy is complex, low hit rate;
- Peak period database connection pool exhausted.

Problems to be solved: Edge cache for "relatively static" dynamic pages.

8.6.3 3. ALB Function and Configuration Matching with Problems

- proxy_cache_path: Define cache storage;
- proxy_cache_valid: Set cache validity period;
- proxy_cache_use_stale: Return expired cache on failure, ensure availability.

8.6.4 4. Configuration and Details Using ALB to Solve This Scenario

```
proxy_cache_path /cache/alb levels=1:2 keys_zone=course_cache:20m
inactive=10m;

location = /course/detail {
    proxy_cache course_cache;
```

```
    proxy_cache_valid 200 10m;
    proxy_cache_use_stale error timeout updating;
    proxy_pass http://course_service;
    add_header X-Cache $upstream_cache_status;
}
```

8.6.5 5. Effect, Before and After Comparison

- Course page cache hit rate 72%;
- Backend QPS drops 65%;
- Users can still see "slightly old but usable" pages during failures.

8.7 Scenario 6: WebSocket Long Connection Proxy

8.7.1 1. Background

Official website integrated online customer service system, using WebSocket for real-time chat.

8.7.2 2. Problems Encountered and Problems to be Solved

- Connection automatically disconnects after 60 seconds of establishment;
- Serious message loss, poor user experience;
- Cannot share port 443 with HTTP.

Problems to be solved: Stable proxy for WebSocket long connections.

8.7.3 3. ALB Function and Configuration Matching with Problems

- `Upgrade` and `Connection` header passthrough;
- `proxy_read_timeout` : Extend read timeout.

8.7.4 4. Configuration and Details Using ALB to Solve This Scenario

```
location /ws/chat/ {
    proxy_pass http://chat_service;
    proxy_http_version 1.1;
    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";
    proxy_read_timeout 86400s;
}
```

8.7.5 5. Effect, Before and After Comparison

- WebSocket connection can stably maintain 24 hours;
- Message arrival rate increases from 82% to 99.9%;
- Share port 443 with HTTPS, simplify network policy.

8.8 Scenario 7: Prevent Malicious Scanning and Directory Traversal Attacks

8.8.1 1. Background

A government information disclosure website is deployed on the public network, recently frequently scanned by automated tools for sensitive paths like `/admin/`, `/.git/`, `/backup.zip`, attempting to obtain internal configuration or source code.

8.8.2 2. Problems Encountered and Problems to be Solved

- Attack requests occupy server resources;
- Large number of 404 requests in logs interfere with normal monitoring;
- Risk of data leakage due to accidentally exposed backup files.

Problems to be solved: Block high-risk path access at entry layer without modifying application code.

8.8.3 3. ALB Function and Configuration Matching with Problems

- `location` exact match + `deny all`: Prohibit access to sensitive directories;
- Regex match hidden files (like `.env`, `.git`);
- Return 444 (ALB specific status code, directly close connection, no response).

8.8.4 4. Configuration and Details Using ALB to Solve This Scenario

```
server {
    listen 80;
    server_name www.govinfo.gov.cn;

    # Prohibit access to hidden files
    location ~ /\. {
        deny all;
        return 444;
    }

    # Prohibit access to common sensitive directories
```

```
    location ~* ^/(admin|phpmyadmin|wp-admin|backup|config)/ {
        deny all;
        return 444;
    }

    # Prohibit downloading specific extension files
    location ~* \.(sql|bak|tar\.gz|zip)$ {
        deny all;
        return 444;
    }

    location / {
        proxy_pass http://backend;
    }
}
```

- `return 444`: No response returned, directly disconnect TCP connection, reducing attacker probing efficiency;
- Regex ~* means case-insensitive, covering more variant paths.

8.8.5 5. Effect, Before and After Comparison

- Daily malicious requests dropped from 12,000+ to <50;
- "Information leakage risk" item in security audit report cleared;
- Server CPU dropped 30% during scan peak period.

8.9 Scenario 8: Cookie-based Canary Release (A/B Testing)

8.9.1 1. Background

E-commerce platform plans to launch new version product detail page, wants to open new version to 10% users first, verify conversion rate before full rollout.

8.9.2 2. Problems Encountered and Problems to be Solved

- Backend has no canary capability, needs gateway layer traffic splitting;
- Require same user to always see same version (session consistency);
- Cannot rely on IP (multiple users share exit).

Problems to be solved: Implement stable canary routing based on user identifier (like Cookie).

8.9.3 3. ALB Function and Configuration Matching with Problems

- map directive: Determine backend based on $cookie_version value;
- Custom variable controls traffic ratio;
- sticky session persistence (implemented through Cookie).

8.9.4 4. Configuration and Details Using ALB to Solve This Scenario

```
# If user has no version cookie, randomly assign (10% probability
set to new)
map $cookie_version $backend_group {
    default "old";
    ""      "auto";  # Go to auto assignment when not set
    "new"   "new";
}

upstream old_backend {
    server 10.0.1.10:8080;
}

upstream new_backend {
    server 10.0.1.20:8080;
}

server {
    listen 80;
    server_name shop.com;

    location /product/ {
        # Unassigned version users: 10% probability tagged as new
        if ($backend_group = "auto") {
            set $rand "";
            set_by_lua_block $rand { return math.random() < 0.1 and
"new" or "old" }
            set $backend_group $rand;
            add_header Set-Cookie "version=$rand; Path=/; Max-
Age=2592000";
```

```
        }

        if ($backend_group = "new") {
            proxy_pass http://new_backend;
        }
        if ($backend_group = "old") {
            proxy_pass http://old_backend;
        }
    }
}
```

8.9.5 5. Effect, Before and After Comparison

- New and old version user isolation is clear, no cross-contamination;
- A/B testing cycle shortened from 2 weeks to 3 days;
- No need to transform business system, canary strategy completely controlled by ALB.

8.10 Scenario 9: Large File Upload Timeout and Shard Support Optimization

8.10.1 1. Background

Online education platform allows teachers to upload courseware (PPT, video), some files exceed 500MB.

8.10.2 2. Problems Encountered and Problems to be Solved

- Default 60 second timeout causes large file upload failure;
- Users need to re-upload entire file when network fluctuates;
- Backend Java application out of memory (OOM).

Problems to be solved: Extend upload timeout, support resumable upload, reduce backend pressure.

8.10.3 3. ALB Function and Configuration Matching with Problems

- client_max_body_size: Allow large request body;
- client_body_timeout / proxy_send_timeout: Extend timeout;
- (Optional) Combine with alb-upload-module or frontend sharding for resumable upload.

8.10.4 4. Configuration and Details Using ALB to Solve This Scenario

```
server {
    listen 80;
    server_name teach.edu.com;

    # Allow maximum 2GB file
    client_max_body_size 2G;

    # Upload related timeout set to 1 hour
    client_body_timeout 3600s;
    proxy_send_timeout 3600s;
    proxy_read_timeout 3600s;

    location /api/upload {
        proxy_pass http://file_service;
        proxy_set_header X-Real-IP $remote_addr;
        # Temporary file storage path (avoid memory caching large
files)
        client_body_temp_path /var/tmp/alb_upload;
    }
}
```

8.10.5 5. Effect, Before and After Comparison

- 500MB+ file upload success rate increased from 40% to 99%;
- Backend OOM errors reduced to zero;
- Users can complete uploads in weak network environment.

8.11 Scenario 10: Static Resource Gzip Compression Acceleration

8.11.1 1. Background

Enterprise official website contains many JS/CSS files, overseas users report slow loading.

8.11.2 2. Problems Encountered and Problems to be Solved

- Compression not enabled, text resources are large;
- Backend dynamic compression consumes CPU;
- High mobile traffic cost.

Problems to be solved: Efficient Gzip compression for text resources at edge layer.

8.11.3 3. ALB Function and Configuration Matching with Problems

- `gzip on` : Enable compression;
- `gzip_types` : Specify compression MIME types;
- `gzip_vary on` : Notify proxy to cache different versions.

8.11.4 4. Configuration and Details Using ALB to Solve This Scenario

```
http {
    gzip on;
    gzip_vary on;
    gzip_min_length 1024;  # Don't compress if less than 1KB
    gzip_comp_level 6;     # Balance CPU and compression ratio
    gzip_types
        text/plain
        text/css
        application/json
        application/javascript
        text/xml
        application/xml
        image/svg+xml;

    server {
        listen 80;
        server_name www.company.com;
        root /var/www/html;
    }
}
```

8.11.5 5. Effect, Before and After Comparison

Resource Type	Original Size	After Gzip	Compression Rate
main.js	850 KB	210 KB	75% ↓
style.css	320 KB	85 KB	73% ↓

- Overall page load time reduced by 40%;
- User bounce rate dropped 18%.

9 ALB Function Module Usage Instructions

9.1 License Usage Instructions

ALB Standard Edition supports local license and unified license. Local license is done by copying the license file to the product installation directory, while unified license is done by connecting to the unified authorization center through the connection information specified in the product.

9.1.1 Local License

1. Get the local machine's feature code

```
# Get the local machine's feature code
./bin/alb-authcode

# Get feature code for specified network interface
./bin/alb-authcode -ac eth0

# Get feature code for specified IP address
./bin/alb-authcode -ac 192.168.1.1
```

> *Note: -ac parameter only supports ALB Standard Edition build date greater than or equal to 202506 2. After obtaining the license code, please contact Kingdee Apusic to send the feature code back to Kingdee Apusic to obtain the license file, or log in to Kingdee Apusic license platform to obtain the license file. 3. Rename the obtained license file to license.xml, then place it in the ALB installation directory.*

9.1.2 Unified License

1. The unified authorization center must contain valid license information for ALB Standard Edition. (Please log in to the authorization center to check. If there is no valid product license information, please refer to the authorization center manual to import valid product license information.)
2. Product configuration connection to the authorization center:

- acls.properties configuration file: acls.properties configuration file is placed in the ALB installation directory.

```
apusic_acls_enable=true                    # Enable variable
unified license
apusic_acls_authUrls=192.168.101.34:6869    # Unified
```

```
authorization center address
apusic_acls_ns=public                          # Namespace
apusic_acls_tenant=public                      # Tenant name
```

- System environment variable configuration

```
export apusic_acls_enable=true                 # Enable
variable unified license
export apusic_acls_authUrls=172.24.3.116:6869  # Unified
authorization center address
export apusic_acls_ns=后付费                    # Namespace
export apusic_acls_tenant=user_env中文          # Tenant name
```

Note: If both license methods are configured, the priority is system environment variable configuration > acls.properties file configuration; if both local license method and unified license method are configured, the unified license method will be used. If license verification fails, subsequent license verification will not be executed.

9.2 ALB Function Module List

Module	Function Description
`--with-http_stub_status_module`	Enable stub_status interface, provide running status statistics.
`--with-http_ssl_module`	Enable HTTPS/SSL support.
`--with-ipv6`	Enable IPv6 listening support.
`--with-http_mp4_module`	Support MP4 streaming pseudo-streaming.
`--with-http_auth_request_module`	Implement sub-request authentication (auth_request), convenient for integration with external authentication services.
`--with-http_gzip_static_module`	Support directly sending .gz pre-compressed files, saving CPU.
`--with-http_realip_module`	Get real client IP from X-Forwarded-For/X-Real-IP and other headers.
`--with-http_gunzip_module`	Automatically decompress response content for clients that don't support gzip.
`--with-http_sub_module`	Response body string replacement (sub_filter).

`--with-stream`	Enable Layer 4 TCP/UDP proxy (stream subsystem).
`--with-stream_ssl_module`	Provide SSL/TLS support for stream subsystem.
`--with-threads`	Enable thread pool support, improve file I/O performance.
`--with-file-aio`	Enable asynchronous file I/O (Linux AIO).
`--with-http_v2_module`	Enable HTTP/2 support.
`--with-http_v3_module`	Enable HTTP/3 (QUIC) support.
`--with-http_addition_module`	Append content before and after response (add_before_body / add_after_body).
`--with-http_dav_module`	Support WebDAV protocol (PUT, DELETE, MKCOL, etc.).
`--with-http_random_index_module`	Randomly select default file when directory indexing.
`--with-http_secure_link_module`	Generate and verify time-limited, tamper-proof "secure links".
`--with-mail`	Enable mail proxy (IMAP/POP3/SMTP) subsystem.
`--with-mail_ssl_module`	Provide SSL/TLS support for mail proxy.
`--with-http_slice_module`	Support large file slice download (Range Slice).
`--with-stream_ssl_preread_module`	Pre-read SNI/ALPN in Layer 4 proxy, implement domain-based routing.
`alb_healthcheck_module`	ALB active health check module, supports Layer 4 and Layer 7 proxy node active health check.
`alb-sticky-module-ng`	Implement session persistence (sticky cookie/route).
`alb-module-vts`	Provide detailed traffic/status statistics interface (`/status`).
`alb-module-stream-sts`	Provide real-time status statistics for stream subsystem.
`alb-module-sts`	Provide real-time status statistics for http subsystem.
`alb_http_proxy_connect_module`	Support HTTP CONNECT method, forward proxy HTTPS traffic.
`alb-rtmp-module`	Introduce RTMP/HLS/DASH live streaming and media functionality.
`alb_brotli`	Support Brotli compression algorithm, reduce transmission size.
`alb-module-lua`	Introduce Lua script functionality, can extend ALB functionality.

`alb-headers-more`	Set and clear request and response headers.

9.3 Product Port Description

ALB default ports are as follows:

- 8080: http service port.
- 8887: ALB console port

If you need to modify the default http proxy port, you can edit the `listen 8080` line in `ALB installation directory/conf/alb.conf` file.

If you need to modify the console port, you can edit the addr field port in the system section of `ALB installation directory/console/conf/config.yaml` file.

9.4 Boot Startup Item | System Service

ALB does not enable automatic boot startup by default. If you need boot startup, switch to the installation directory and execute:

```
cd /opt/ALB-V2.0.5-SE-amd64          # Enter installation directory
./utils/systemd/enable_startup.sh    # Automatically set boot
startup item.
systemctl start alb                  # Start ALB
```

9.4.1 Remove System Startup Item

```
cd /opt/ALB-V2.0.5-SE-amd64          # Enter installation directory
./utils/systemd/remove_startup.sh    # Remove boot startup item
```

9.5 Start ALB as Regular User and Enable Port 80 Listening

ALB supports modifying program permissions to allow listening on port 80 as a regular user. The specific operations are as follows:

1. Switch to root user and switch to the ALB installation directory.
2. Authorize listening on port 80: `setcaps cap_net_bind_service=+eip ./sbin/alb`
3. Switch back to regular user

9.6 Load Balancing Algorithms

9.6.1 Round Robin

Round Robin is ALB's default load balancing algorithm, assigning requests to backend servers in turn according to time order. If a server goes down, ALB will automatically remove it.

After configuring multiple backend servers as follows, the round robin load balancing algorithm is used by default.

```
upstream backend {
    server backend1.example.com;
    server backend2.example.com;
}
```

9.6.2 Weighted Round Robin

On the basis of round robin, requests are allocated according to the specified weight. Servers with higher weights handle more requests, suitable for situations where server performance is uneven.

After configuring multiple backend servers as follows, use the weight parameter to specify the weight.

```
upstream backend {
    server backend1.example.com weight=10;  # Set weight through
weight parameter
    server backend2.example.com weight=20;
}
```

9.6.3 IP Hash

Based on the client's IP address hash calculation, requests are allocated to backend servers. It can ensure that requests from the same IP address are always allocated to the same backend server.

After configuring multiple backend servers as follows, enable IP Hash load balancing algorithm by using the ip_hash directive.

```
upstream backend {
    ip_hash;  # Enable IP hash load balancing
    server backend1.example.com;
```

```
    server backend2.example.com;
}
```

9.6.4 Least Connections

Allocate based on the current active connection count of backend servers, assigning requests to the backend server with the fewest active connections. Suitable for scenarios where request processing time varies greatly.

After configuring multiple backend servers as follows, enable least connections load balancing algorithm by using the least_conn directive.

```
upstream backend {
    least_conn;  # Enable least connections load balancing
    server backend1.example.com;
    server backend2.example.com;
}
```

9.7 Health Check

ALB supports health checks for backend servers. When a backend server's response does not meet expectations, ALB will remove it.

9.7.1 Passive Health Check

Passive health check is executed automatically by ALB, judging whether it is healthy based on the backend server's response status code and timeout.

ALB's passive health check is configured through `fail_timeout` and `max_fails` parameters.

- `fail_timeout` : Specifies the time period after consecutive failures when ALB will mark the backend server as unhealthy. Default value is 10 seconds.
- `max_fails` : Specifies the number of consecutive failures within the `fail_timeout` time period. Default value is 3.

For example, if you want to mark a backend server as unavailable after 3 consecutive failures and not send requests to it for the next 30 seconds, you can configure as follows:

```
upstream backend {
    server 192.168.0.1:80 fail_timeout=30s max_fails=3;
```

```
    server 192.168.0.2:80 fail_timeout=30s max_fails=3;
}
```

Note:

- If the backend server is still unavailable after the time set by fail_timeout ends, ALB will try to send requests to that server again.
- When the backend server returns to normal, ALB will automatically add it back to the round robin queue.
- Using these directives can help reduce the impact of brief failures caused by network fluctuations on user experience.

9.7.2 Active Health Check

Active health check is executed periodically by ALB, judging whether it is healthy by sending specific requests to the backend server. If the request returns successfully, the backend server is considered healthy; otherwise, it is marked as unhealthy.

9.7.2.1 Layer 7 HTTP Proxy Health Check

ALB's active health check is configured through the `check` directive.

```
upstream backend {
    server 192.168.0.1:80;
    server 192.168.0.2:80;

    # Enable health check
    check interval=3000 rise=2 fall=3 timeout=2000 type=http;

    # Define health check URL
    check_http_send "GET /healthcheck HTTP/1.0\r\nHost:
www.example.com\r\n\r\n";
    check_http_expect_alive http_2xx http_3xx;
}
```

Configuration directive explanation:

- check: Enable health check, configure basic parameters for health check.
- interval: Define the interval between two checks (unit: milliseconds).
- rise: Define how many consecutive successful responses before the backend server is considered healthy.
- fall: Define how many consecutive failed responses before the backend server is considered unhealthy.

- timeout: Define the timeout for a single health check request (unit: milliseconds).
- type: Define the type of health check request, such as http or tcp.
- check_http_send: Define the HTTP request sent to the backend server.
- Here a GET request is used to check the /healthcheck path.
- check_http_expect_alive: Define the expected successful response status code range from the backend server.
- http_2xx and http_3xx indicate expecting to receive 2xx and 3xx status codes.

9.7.2.2 Layer 4 TCP Proxy Health Check

ALB active health check supports TCP proxy, the following is an example:

```
stream {
    upstream tcp-cluster {
        server 127.0.0.1:22;
        server 192.168.0.2:22;
        check interval=3000 rise=2 fall=5 timeout=5000
default_down=true type=tcp;
    }
    server {
        listen 522;
        proxy_pass tcp-cluster;
    }

    upstream udp-cluster {
        server 127.0.0.1:53;
        server 8.8.8.8:53;
        check interval=3000 rise=2 fall=5 timeout=5000
default_down=true type=udp;
    }
    server {
        listen 53 udp;
        proxy_pass udp-cluster;
    }
}
```

9.7.2.3 Different Type Descriptions

1. TCP Health Check (type=tcp), Supports Layer 7 and Layer 4 Proxy

TCP health check is one of the simplest types, it only needs to establish a TCP connection to the backend server and read one byte to determine if the server is reachable. Here is an example configuration:

```
http {
    upstream backend {
        server 192.168.0.1:80;
        server 192.168.0.2:80;

        check interval=3000 rise=2 fall=3 timeout=2000 type=tcp;

    }

    server {
        listen 80;
        server_name example.com;

        location / {
            proxy_pass http://backend;
        }
    }
}
```

2. HTTP Health Check (type=http), Supports Layer 7 and Layer 4 Proxy

HTTP health check judges the server's status by sending an HTTP request to the backend server. Here is an example configuration:

```
http {
    upstream backend {
        server 192.168.0.1:80;
        server 192.168.0.2:80;

        check interval=3000 rise=2 fall=3 timeout=2000 type=http;

        # Send a GET request to /healthcheck path
```

```
        check_http_send "GET /healthcheck HTTP/1.0\r\nHost:
www.example.com\r\n\r\n";

        # Expect server to return 2xx or 3xx status codes to
indicate healthy
        check_http_expect_alive http_2xx http_3xx;
    }

    server {
        listen 80;
        server_name example.com;

        location / {
            proxy_pass http://backend;
        }
    }
}
```

3. SSL Hello Health Check (type=ssl_hello)

SSL Hello health check judges whether the server is healthy by sending an SSL client Hello packet and receiving the server's SSL Hello packet. Here is an example configuration:

```
http {
    upstream backend {
        server 192.168.0.1:443;
        server 192.168.0.2:443;

        check interval=3000 rise=2 fall=3 timeout=2000
type=ssl_hello;
    }

    server {
        listen 443 ssl;
        server_name example.com;
```

```
        location / {
            proxy_pass https://backend;
        }
    }
}
```

4. MySQL Health Check (type=mysql)

MySQL health check judges whether the database server is healthy by establishing a MySQL connection and receiving a greeting response.

```
http {
    upstream backend {
        server 192.168.0.1:3306;
        server 192.168.0.2:3306;

        check interval=3000 rise=2 fall=3 timeout=2000 type=mysql;
    }

    server {
        listen 80;
        server_name example.com;

        location / {
            proxy_pass http://backend;
        }
    }
}
```

5. FastCGI Health Check (type=fastcgi)

FastCGI health check judges whether the server is healthy by sending a FastCGI request and receiving a response.

```
http {
    upstream backend {
        server 192.168.0.1:9000;
        server 192.168.0.2:9000;
```

```
        check interval=3000 rise=2 fall=3 timeout=2000 type=fastcgi;
    }

    server {
        listen 80;
        server_name example.com;

        location / {
            proxy_pass fastcgi://backend;
        }
    }
}
```

6. UDP Health Check (type=udp), Supports Layer 7 and Layer 4 Proxy

UDP health check judges whether the server is healthy by sending a UDP request and receiving a response.

```
stream {
    upstream udp-cluster {
        server 127.0.0.1:53;
        server 8.8.8.8:53;
        check interval=3000 rise=2 fall=5 timeout=5000
default_down=true type=udp;
    }
    server {
        listen 53 udp;
        proxy_pass udp-cluster;
    }
}
```

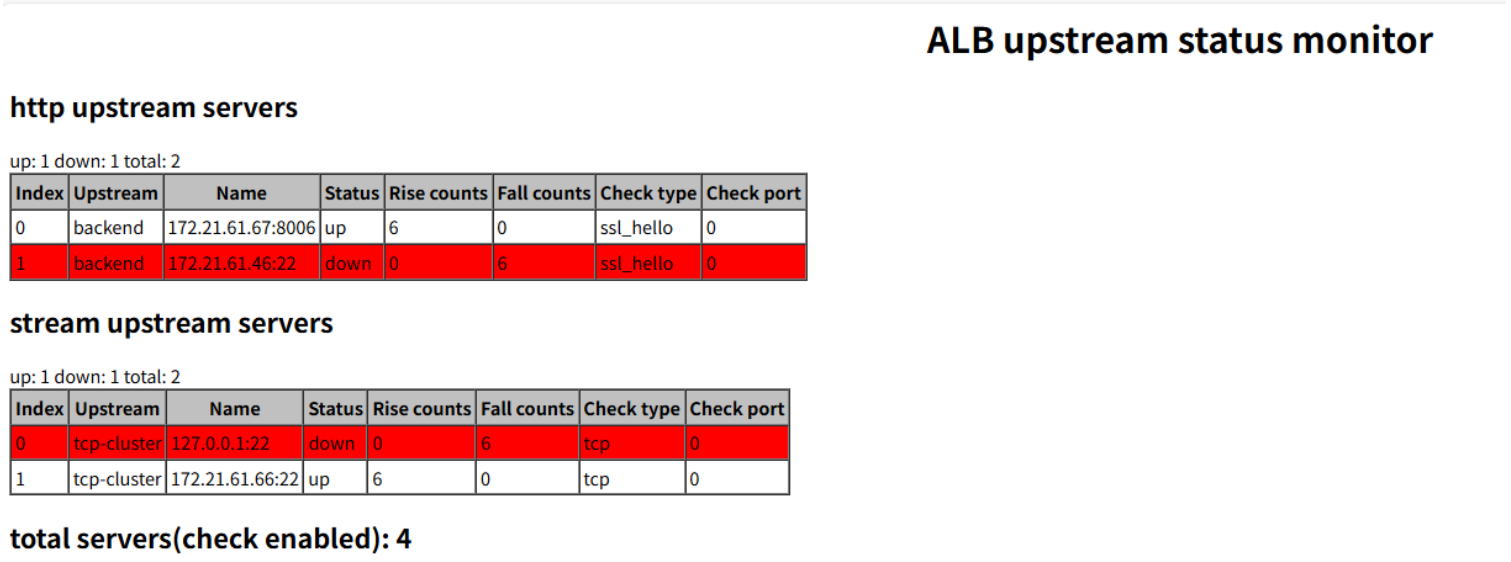
9.7.2.4 Active Health Check Status Retrieval

ALB supports obtaining active health check status through a specified interface, as follows:

1. Enable active health check status retrieval

```
# Omit other configurations

http {
    server {
        listen 8080;

        # Get active health check status URL
        # Get health status data page through ALB's 8080 port
/status interface
        location /status {
            healthcheck_status html;
        }
    }
    # Omit other configurations
}
```

Access the 8080 port /status interface to get the health status data page:



ALB upstream status monitor

http upstream servers

up: 1 down: 1 total: 2

Index	Upstream	Name	Status	Rise counts	Fall counts	Check type	Check port
0	backend	172.21.61.67:8006	up	6	0	ssl_hello	0
1	backend	172.21.61.46:22	down	0	6	ssl_hello	0

stream upstream servers

up: 1 down: 1 total: 2

Index	Upstream	Name	Status	Rise counts	Fall counts	Check type	Check port
0	tcp-cluster	127.0.0.1:22	down	0	6	tcp	0
1	tcp-cluster	172.21.61.66:22	up	6	0	tcp	0

total servers(check enabled): 4

2. Supported types

- html: Return HTML page
- json: Return JSON data
- csv: Return CSV data
- prometheus: Return Prometheus format data

9.8 Monitoring

ALB provides rich monitoring indicators, including:

1. Simple traffic statistics data, does not support Prometheus collection.
2. Prometheus-exporter, supports simple traffic data collection, supports Prometheus.
3. VTS monitoring data, ALB fine-grained monitoring data, supports HTML page display, JSON data and Prometheus collection.

Note: You can choose one of the three methods above as needed.

9.8.1 Simple Traffic Statistics Data

ALB provides simple traffic statistics information, its monitoring data includes:

- Active connections: Current active connection count.
- Server accepts, handled, requests: Connections accepted and processed since ALB started, and requests received.
- Reading: Number of client requests currently being read.
- Writing: Number of responses currently being written to clients.
- Waiting: Number of connections currently in waiting state. These connections have completed reading operations and are waiting for the next write operation.

9.8.1.1 Configure Simple Traffic Statistics Data and Retrieval

In the ALB configuration file, add the following content:

```
server {
    listen 8080;            # node_status port

    location /node_status {
        stub_status on;     # Enable node_status function
    }
}
```

After starting ALB, visit http://alb_ip:8080/node_status to view.

9.8.2 Prometheus-exporter (Prometheus Monitoring Data)

ALB provides Prometheus monitoring functionality, not enabled by default. To enable, switch to the utils/exporter directory,

Execute: `./start-exporter.sh` to start ALB's exporter.

9.8.2.1 Startup Instructions

To start ALB's exporter, you must enable the stub_status function in the configuration file, as follows:

```
server {
  listen 8080;            # node_status port
  location /node_status { # Must use node_status
        stub_status on;   # Enable stub_status
        access_log off;
        allow 127.0.0.1;
    }
}
```

After executing the start-exporter script, you need to input:

- The server listening port corresponding to node_status, default is 8080.
- The exporter listening port, default is 9113

The following is the input process:

```
root@root:/opt/ALB-V2.0.5-SE-amd64/utils/expoter$ ./start-
exporter.sh
input alb server listening port(Please enter node_status listening
port):
alb server listening port(ALB node_status port): 8080
input exporter listening port(Please enter listening port):
exporter listening port is 9113
exporter are running now!(Exporter started successfully)
```

9.8.2.2 Prometheus Monitoring Data Retrieval

After successful start-exporter, you can access through browser or prometheus: `http://IP:9113/metrics` to get monitoring data.

Note: If you modified the exporter's listening port above, the 9113 in the above URL should also be modified.

9.8.3 VTS Monitoring Data

The vts module provides more detailed monitoring information, including connection count, status codes, etc. Compared with the above two monitoring methods, the vts module can provide more comprehensive and rich monitoring data. Through the vts module, you can gain a deeper understanding of ALB's running status.

9.8.3.1 Monitoring Indicator Description

Monitoring Category	Indicator Name	Description
1. Basic Information	Host Information	Host name or IP address where the proxy server is located
	Version Number	ALB or monitoring module version
	Server Running Time	Time the ALB process has been running (usually in seconds)
2. Connection Information	Current Client Connections	Number of currently active client connections
	Total Client Connections Read	Cumulative connections reading requests from clients
	Total Client Connections Written	Cumulative connections writing responses to clients
	Total Client Connections Processed	Cumulative total client connections processed
3. HTTP Virtual Host Monitoring	Total Requests	Total requests received by this virtual host
	Requests Per Second (RPS)	Current requests processed per second
	1xx Status Code Statistics	Cumulative count of all 1xx status codes (like 100, 101)
	2xx Status Code Statistics	Cumulative count of all 2xx successful responses (like 200, 201)
	3xx Status Code Statistics	Cumulative count of all redirect responses (like 301, 302)
	4xx Status Code Statistics	Cumulative count of client errors (like 404, 403)
	5xx Status Code Statistics	Cumulative count of server errors (like 500, 502)

	All Status Code Statistics	Sum of all non-2xx responses (or summary of all status code classifications)
	Total Traffic Sent	Total bytes sent by this virtual host to clients
	Total Traffic Received	Total bytes received by this virtual host from clients
	Traffic Send Rate	Current bytes sent per second (B/s)
	Traffic Receive Rate	Current bytes received per second (B/s)
4. HTTP Cache Monitoring	Cache Hits	Number of requests that hit cache
	Cache Misses	Number of requests that missed cache
	Cache Bypasses	Request count bypassing cache due to bypass configuration
	Cache Expired	Count of cache items expired and discarded
	Cache Invalidated	Cache removal count due to active invalidation (like purge)
	Cache Updated	Count of cache updates (like stale-while-revalidate)
	Cache Revalidated	Cache request count needing revalidation from origin
	Total Cache	Sum of cache hits + misses + bypasses (or current total cache items)
5. HTTP Upstream Server Monitoring	Service Status	Current upstream server status (up/down/checking)
	Service Weight	Configured weight value
	Max Failures	max_fails configuration value
	Failure Downtime	fail_timeout configuration value (unit: seconds)
	Total Requests	Total requests sent to this upstream
	Requests Per Second	Current requests per second sent to this upstream
	1xx-5xx Status Code Statistics	Cumulative counts for each status code category

9.8.3.2 VTS Module Configuration and Viewing

The following is an example configuration for enabling vts:

```
http {
    vhost_traffic_status_zone;                  # Enable vts module

    ...

    server {

        ...

        location /status {                      # Configure uri address
for vts viewing
            vhost_traffic_status_display;       # Current /status uri
displays vts monitoring indicators
            vhost_traffic_status_display_format html;   # Set default
format as html page
        }
    }
}
```

- HTML Monitoring Data Viewing

View the monitoring page through browser: `http://IP:Port/status`

ALB Vhost Traffic Status

Server main

Host	Version	Uptime	Connections				Requests				Shared memory			
			active	reading	writing	waiting	accepted	handled	Total	Req/s	name	maxSize	usedSize	usedNode
mofant	2.0.1	27.18s	2	0	1	1	11	11	12	0	ngx_http_vhost_traffic_status	1024.0 KiB	3.4 KiB	1

Server zones

Zone	Requests			Responses						Traffic				Cache								
	Total	Req/s	Time	1xx	2xx	3xx	4xx	5xx	Total	Sent	Rcvd	Sent/s	Rcvd/s	Miss	Bypass	Expired	Stale	Updating	Revalidated	Hit	Scarce	Total
localhost	11	0	0ms	0	10	0	1	0	11	71.3 KiB	9.0 KiB	2.3 KiB	893 B	0	0	0	0	0	0	0	0	0
*	11	0	0ms	0	10	0	1	0	11	71.3 KiB	9.0 KiB	2.3 KiB	893 B	0	0	0	0	0	0	0	0	0

update interval: 1 sec

- JSON Data Format Viewing

Get JSON data through browser or curl: `http://IP:Port/status/format/json`

- Prometheus Monitoring Indicator Data Interface

Can integrate directly with Prometheus: `http://IP:Port/status/format/prometheus`

9.8.3.3 Custom Monitoring Indicators

The `vhost_traffic_status_filter_by_set_key` directive allows you to specify a key name. VTS will filter traffic statistics based on this key name. Usually, this key name corresponds to a variable defined in the set directive.

```
vhost_traffic_status_filter_by_set_key key_name;
# Configuration areas: http, server, location
```

Description: Enable key through user-defined variable. Key is a string used to calculate traffic. Name is a string used to calculate traffic group. Key and name can contain variables, such as $host, $server_name. If specified, name belongs to that group. If the second parameter name is not specified, key belongs to the group.

Example:

```
http {
    vhost_traffic_status_zone;              # Enable vts module

    ...

    server {

        ...
        vhost_traffic_status_filter_by_set_key  $uri uri::*;   #
Filter uri, count traffic for different uris
        location /status {                   # Configure uri address
for vts viewing
            vhost_traffic_status_display;    # Current /status uri
displays vts monitoring indicators
            vhost_traffic_status_display_format html;  # Set default
format as html page
        }
```

```
        }
    }
```

After configuration, you can view traffic for different uris:

ALB Vhost Traffic Status

Server main

Host	Version	Uptime	Connections				Requests				Shared memory			
			active	reading	writing	waiting	accepted	handled	Total	Req/s	name	maxSize	usedSize	usedNode
mofant	2.0.1	46.43s	2	0	1	1	123	123	122	1	ngx_http_vhost_traffic_status	1024.0 KiB	20.7 KiB	6

Server zones

Zone	Requests			Responses						Traffic				Cache								
	Total	Req/s	Time	1xx	2xx	3xx	4xx	5xx	Total	Sent	Rcvd	Sent/s	Rcvd/s	Miss	Bypass	Expired	Stale	Updating	Revalidated	Hit	Scarce	Total
localhost	121	1	0ms	0	117	0	4	0	121	547.0 KiB	95.6 KiB	8.2 KiB	899 B	0	0	0	0	0	0	0	0	0
*	121	1	0ms	0	117	0	4	0	121	547.0 KiB	95.6 KiB	8.2 KiB	899 B	0	0	0	0	0	0	0	0	0

Filters

uri::*

Zone	Requests			Responses						Traffic				Cache								
	Total	Req/s	Time	1xx	2xx	3xx	4xx	5xx	Total	Sent	Rcvd	Sent/s	Rcvd/s	Miss	Bypass	Expired	Stale	Updating	Revalidated	Hit	Scarce	Total
/status/	2	0	0ms	0	2	0	0	0	2	105.0 KiB	2.0 KiB	0 B	0 B	0	0	0	0	0	0	0	0	0
/index.html	6	0	0ms	0	6	0	0	0	6	5.0 KiB	6.1 KiB	0 B	0 B	0	0	0	0	0	0	0	0	0
/node_status	1	0	0ms	0	1	0	0	0	1	242 B	125 B	0 B	0 B	0	0	0	0	0	0	0	0	0
/status/format/json	39	1	0ms	0	39	0	0	0	39	238.7 KiB	34.1 KiB	8.2 KiB	899 B	0	0	0	0	0	0	0	0	0
/favicon.ico	3	0	0ms	0	0	0	3	0	3	2.1 KiB	2.9 KiB	0 B	0 B	0	0	0	0	0	0	0	0	0

update interval: 1 sec

JSON

9.8.3.4 Stream Monitoring

ALB-VTS module supports stream module monitoring. By default, the module does not enable stream module support. Its usage is as follows:

```
http {
    stream_server_traffic_status_zone;  # Enable stream vts module

    ...

    server {

        ...

        location /stream/status {      # Monitoring indicator exposed
uri
            stream_server_traffic_status_display;
```

```
            stream_server_traffic_status_display_format html;
        }
    }
}

stream {
    server_traffic_status_zone;   # Monitored stream

    ...

    server {
        ...
    }
}
```

- HTML Monitoring Data Viewing

View the monitoring page through browser: `http://IP:Port/stream/status`

ALB Stream Traffic Status

Server main

Host	Version	Uptime	Connections				Requests				Shared memory			
			active	reading	writing	waiting	accepted	handled	Total	Req/s	name	maxSize	usedSize	usedNode
mofant	2.0.1	26.35s	2	0	1	1	457	457	1597	1	stream_server_traffic_status	1024.0 KiB	0 B	0

Server zones

Zone	Port	Protocol	Requests			Responses						Traffic			
			Total	Req/s	Time	1xx	2xx	3xx	4xx	5xx	Total	Sent	Rcvd	Sent/s	Rcvd/s
*	0	TCP	0	0	0ms	0	0	0	0	0	0	0 B	0 B	0 B	0 B

Upstreams

tcp_backend

Server	State	Response Time			Weight	MaxFails	FailTimeout	Requests			Responses						Traffic			
		Connect	FirstByte	Response				Total	Req/s	Time	1xx	2xx	3xx	4xx	5xx	Total	Sent	Rcvd	Sent/s	Rcvd/s
172.21.32.106:9898	up	0ms	0ms	0ms	1	1	10	0	0	0ms	0	0	0	0	0	0	0 B	0 B	0 B	0 B
172.21.32.107:9898	up	0ms	0ms	0ms	1	1	10	0	0	0ms	0	0	0	0	0	0	0 B	0 B	0 B	0 B

update interval: 1 sec

JSON

- JSON Data Format Viewing

Get JSON data through browser or curl: `http://IP:Port/stream/status/format/json`

- Prometheus Monitoring Indicator Data Interface

Can integrate directly with Prometheus: `http://IP:Port/stream/status/format/prometheus`

9.8.3.5 VTS Monitoring Indicator Grafana Integration

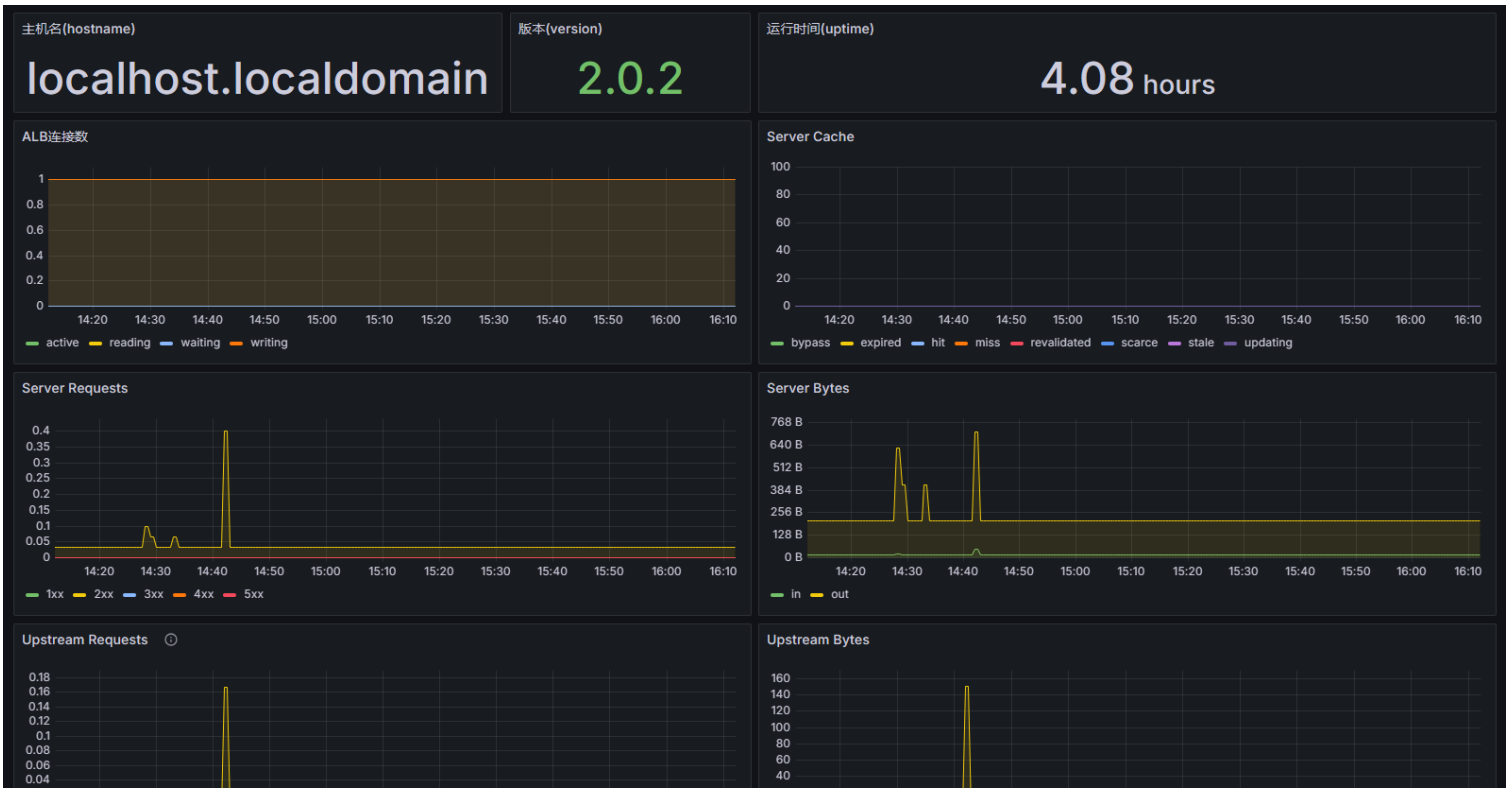
The above VTS monitoring indicators provide prometheus collection format. In prometheus, you can configure the following collection:

```
scrape_configs:
- job_name: 'alb-vts-status'
  honor_timestamps: true
  scrape_interval: 1m
  scrape_timeout: 10s
  metrics_path: /status/format/prometheus # ALB vts monitoring
indicator collection url
  scheme: http
  enable_compression: true
  follow_redirects: true
  enable_http2: true
  static_configs:
  - targets:
      - 172.21.61.66:8080                # ALB VTS monitoring
indicator collection address
    labels:
      group: 'alb'
      instance: 'alb'
```

Among them, the grafana Dashboard example configuration file path:

`ALB installation directory/utils/grafana/alb-grafana.json`

The display effect of the example configuration file is as follows:



You can import this configuration file in the deployed grafana to implement the above monitoring dashboard.

9.9 TCP Proxy

ALB's stream module can be used for TCP proxy. Configure the stream module in the alb configuration file to implement tcp proxy.

The following is a tcp proxy example:

```
# TCP proxy
stream {
    upstream backend {
        server 127.0.0.1:8080;
    }

    server {
        listen 443;    # Listening port

        proxy_pass backend;   # Forward to backend
    }
```

```
}

# The following is HTTP configuration content
http {
  # Omitted
}
```

Note: TCP proxy configuration can only be written in the outermost configuration, cannot be written in http block or imported through include in http block.

9.10 TCP Proxy Acceleration

ALB TCP proxy acceleration is based on the kernel eBPF function, implementing efficient packet processing and forwarding mechanisms in the data plane, significantly improving TCP proxy performance.

9.10.1 Kernel eBPF Accelerated TCP Forwarding Advantages

- Zero-copy forwarding: Through eBPF program directly processing network packets in kernel mode, avoiding frequent data copies between user mode and kernel mode in traditional methods.
- Intelligent routing decisions: Utilizing eBPF's efficient matching capability, quickly determine the forwarding path for data packets to enable TCP proxy.

9.10.2 Configuration Requirements

- User permissions:
    - user directive must use a privileged user (like root, admin)
    - Or if the kernel supports it, set /proc/sys/kernel/unprivileged_bpf_disabled to 0 to use unprivileged users
- Connection count limit:
    - Total connections not exceeding 1000000 (1 million)
- Hardware configuration:
    - Memory: >= 16G
- Kernel version:
    - `kernel` version >= 5.15
- ALB product package requirement:

- Like `ALB-V2.0.5-SE-20251127-amd64-ebpf.tar.gz`, suffix carries ebpf feature.

9.10.3 Usage Example

```
user root;


stream {
    upstream backend_servers {
        server 127.0.0.1:20001;
    }

    # Global configuration
    ebpf_proxy_timeout 600;  # Idle timeout when no data forwarding
between upstream and downstream (seconds)
    ebpf_enable on;          # Globally enable eBPF acceleration

    server {
        listen 10000;
        ebpf_enable on;          # Enable eBPF in specific server
(can override global settings)
        proxy_pass backend_servers;
    }

    server {
        listen 10001;
        ebpf_enable off;         # Disable eBPF acceleration
        proxy_pass backend_servers;
    }
}
```

9.10.4 Configuration Parameter Description

9.10.4.1 ebpf_status_return

- Syntax: `ebpf_status_return ;`
- Context: server

- Function: Return simple status information for debugging purposes
- Example:

```
server {
    listen 30001;
    ebpf_status_return;
}
```

9.10.4.2 ebpf_enable

- Syntax: `ebpf_enable on | off ;`
- Default: off
- Context: main, server
- Function: Enable or disable eBPF acceleration function
- Example:

```
# Globally enable
ebpf_enable on;

server {
    listen 10000;
    # Enable in specific server
    ebpf_enable on;
    proxy_pass backend;
}
```

9.10.4.3 ebpf_proxy_timeout

- Syntax: `ebpf_proxy_timeout milliseconds ;`
- Default: 600000 (unit milliseconds, = 600 seconds)
- Context: main, server
- Function: eBPF connection disconnect time, if long connection, please set to 0
- Example:

```
# Global setting
ebpf_proxy_timeout 300000;
```

```
server {
    listen 10000;
    # Override at server level
    ebpf_proxy_timeout 60000;
    proxy_pass backend;
}
```

9.10.4.4 ebpf_proxy_buffer_size

- Syntax: `ebpf_proxy_buffer_size size;`
- Default: 16384 (16KB)
- Context: main, server
- Function: Set buffer size for storing data received from upstream
- Example:

```
# Global setting
ebpf_proxy_buffer_size 32k;

server {
    listen 10000;
    # Set at server level
    ebpf_proxy_buffer_size 64k;
    proxy_pass backend;
}
```

9.10.4.5 ebpf_timer_period

- Syntax: `ebpf_timer_period milliseconds;`
- Default: 2000 (2 seconds)
- Context: main, server
- Function: Set timer period for updating traffic statistics
- Example:

```
# Global setting
ebpf_timer_period 1000;
```

```
server {
    listen 10000;
    # Set at server level
    ebpf_timer_period 5000;
    proxy_pass backend;
}
```

9.11 TCP Proxy ADMQ

ALB supports using TCP protocol to proxy ADMQ services. Below is an example of using ALB Standard Edition to proxy ADMQ services.

9.11.1 Configuration Process

1. ADMQ deployed (omitted)
2. ALB deployed (omitted)
3. Modify ALB configuration to support ADMQ proxy
4. Verify ADMQ service proxy

9.11.2 ADMQ Environment and Proxy Requirements

- Assume the target ADMQ cluster has three service nodes: 172.253.168.90, 172.253.168.91, 172.253.168.92, MQTT service port is 5682.
- Assume ALB also opens port 5682 to provide ADMQ services externally.

9.11.3 Modify ALB Configuration to Support TCP Proxy ADMQ

Edit `ALB installation directory/conf/alb.conf` file, add the following configuration in the outermost layer above the `http` configuration:

```
stream {
    upstream mq_server {
        server 172.253.168.90:5682 max_fails=3 fail_timeout=10s;
        server 172.253.168.91:5682 max_fails=3 fail_timeout=10s;
        server 172.253.168.92:5682 max_fails=3 fail_timeout=10s;
    }
```

```
    server {
        listen 5682 so_keepalive=on;    # ALB listens on port 5682
        proxy_connect_timeout 15s;     # Connection timeout
        proxy_timeout 300s;
        proxy_pass mq_server;           # ALB reverse proxy to three
mq nodes
    }
}


# The following is http configuration content, no need to modify
http {
    .... # Omitted
}
```

9.11.4 Verify ALB Proxy ADMQ Service

- Check if ALB listening port 5682 exists.
- If the corresponding port exists, use MQ client to verify through ALB's IP and port 5682.

9.12 Streaming Response Proxy

ALB supports streaming response proxy, meaning ALB does not cache responses but directly forwards them to clients. This is commonly used in various AI/ChatGPT and chatbot scenarios. Below is a configuration example:

```
location /streaming {
    proxy_pass http://backend_server;

    proxy_cache off; # Disable cache
    proxy_buffering off; # Disable proxy buffering
    chunked_transfer_encoding on; # Enable chunked transfer encoding
    tcp_nopush off; # Disable TCP NOPUSH option, allow fast sending of
small packets to reduce latency
    tcp_nodelay on; # Enable TCP NODELAY option, disable delayed ACK
algorithm
    keepalive_timeout 300; # Set keep-alive timeout to 300 seconds
}
```

9.12.1 Configuration Details

- `proxy_cache off`

  > *Disable cache function, prevent proxy server from caching streaming response content, ensure clients can receive real-time, complete responses.*

- `proxy_buffering off`

  > *Disable proxy server response buffering, prevent it from buffering the entire response before sending to client, thus achieving true streaming transmission effect.*

- `chunked_transfer_encoding on`

  > *Enable chunked transfer encoding, allowing responses to be transmitted in multiple chunks. This is key to implementing streaming transmission.*

- `tcp_nopush off`

  > *Disable TCP NOPUSH option, allow fast sending of small packets.*

- `tcp_nodelay on`

  > *Enable TCP NODELAY option, disable delayed ACK algorithm. This helps reduce ACK packet delay, ensure data is sent timely.*

- `keepalive_timeout 300`

  > *Increase keepalive timeout, prevent connection between proxy and source server from being closed before streaming response completes. Here set to 300 seconds, can be adjusted according to actual needs.*

9.13 Log Configuration

ALB supports two types of logs: access logs and error logs. Below is a detailed introduction to the configuration methods for these two types of logs.

9.13.1 Access Logs

Access logs record information for each HTTP request, including request method, request URI, response status code, response size, client IP address, etc.

9.13.1.1 Access Log Configuration

Access logs can be configured through the access_log directive. This directive can appear in http, server or location blocks.

9.13.1.2 Basic Configuration Example

```
http {
    log_format main '$remote_addr - $remote_user [$time_local]
"$request" '
                    '$status $body_bytes_sent "$http_referer" '
                    '"$http_user_agent" "$http_x_forwarded_for"';

    server {
        listen 80;
        server_name example.com;

        access_log /var/log/alb/example.access.log main;
    }
}
```

- log_format: Define the format of log entries. The above example defines a format named main
- access_log: Specify the location of the log file and the format used. In this example, the log file is saved at /var/log/alb/example.access.log and uses the main format.

9.13.1.3 Log Format Details

- $remote_addr: Client IP address.
- $remote_user: Authenticated username.
- $time_local: Local timestamp.
- $request: Complete request line.
- $status: HTTP status code.
- $body_bytes_sent: Response body size sent to client.
- $http_referer: Request's Referer header.
- $http_user_agent: Client's User-Agent header.
- $http_x_forwarded_for: X-Forwarded-For header, commonly used in reverse proxy environments.

9.13.1.4 Disable Access Logs

If you don't want to record access logs, you can set access_log to off:

```
access_log off;
```

9.13.2 Error Logs

Error logs record error information encountered during ALB operation, which is very important for debugging and maintenance.

9.13.2.1 Configure Error Logs

Error logs are configured through the error_log directive. This directive can appear in http, server or location blocks.

9.13.2.2 Basic Configuration

```
http {
    error_log /var/log/alb/error.log warn;

    server {
        listen 80;
        server_name example.com;
    }
}
```

- error_log: Specify the location of the error log file and the minimum recording level. In this example, the error log is saved at /var/log/alb/error.log and only records warn level and above errors.

9.13.2.3 Log Levels

Error log levels include:

- debug: Debug information.
- info: General information.
- notice: Important information.
- warn: Warning information.
- error: Error information.
- crit: Critical error information.
- alert: Alert information.
- emerg: Emergency information.

9.13.3 Log Rotation

Since log files will continue to grow, regularly cleaning and splitting log files is very important. ALB provides a default log rotation tool that automatically generates log rotation scripts (Shell scripts or logrotate configurations) based on JSON configuration files, and automatically registers them to system crontab to achieve automated log rotation.

Supports the following logs:

- ✅ Single log file (like /var/log/app.log)
- ✅ Wildcard log paths (like /var/log/alb/*.log)
- ✅ Two log rotation modes: shell or logrotate
- ✅ Automatic compression, retention days control, process signal notification (USR1)
- ✅ Install/list/uninstall task full lifecycle management
- ✅ Secure crontab automatic registration and cleanup

9.13.3.1 Tool Structure Description

Tool directory: `ALB installation directory/utils/logrotate`

```
.
├── logrotate-config.json        ← Configuration file (default name)
├── shell_scripts/               ← Generated Shell scripts directory
│   └── <task-name>.sh
├── logrotate_configs/           ← Generated logrotate configuration
directory
│   └── <task-name>
├── installed_tasks.json         ← Installed tasks metadata (for
list/remove)
```

Field	Type	Required	Description
name	string	✅	Task name (used for filename and comments)
log_file	string	✅	Log path, supports wildcards (like *.log); if relative path, will automatically append to albBaseDir
mode	string	✅	"shell" or "logrotate"
retain_days	int	❌	Retention days, default 7 days
compress	bool	❌	Whether to compress old logs, default false
cron_schedule	string	❌	cron expression (like "0 2 * * *"), default "0 1 * * *" (daily at 1 AM)

9.13.3.2 Example Configuration

```
[
  {
    "name": "alb-access",
```

```
    "log_file": "logs/access.log",
    "mode": "shell",
    "retain_days": 14,
    "compress": true,
    "cron_schedule": "0 2 * * *"
  },
  {
    "name": "alb-error",
    "log_file": "logs/error.log",
    "mode": "logrotate",
    "retain_days": 30,
    "compress": true
  },
  {
    "name": "all-app-logs",
    "log_file": "logs/app/*.log",
    "mode": "logrotate",
    "retain_days": 7,
    "compress": false
  }
]
```

> ✅ *Relative path logs/access.log will be automatically converted to absolute path: /path/to/alb/logs/access.log*
> ✅ *Wildcard logs/app/*.log can be correctly handled in both logrotate and shell modes*

9.13.3.3 Usage

0. Permission Requirements

- Need read/write permissions for the log directory
- Need to be able to execute `crontab -l / crontab -` (usually regular user is sufficient)
- If logs are written by root, it's recommended to run this tool with the same user identity
- If executable is guaranteed, switch to root user to run this tool
- Switch to utils/logrotate directory to execute

1. Install Task (Generate script + Register crontab)

```
# Switch to utils/logrotate directory (required)
cd utils/logrotate
```

```
# Install log rotation task using default configuration file
./logrotate-gen -install
```

After execution:

- Generate Shell scripts to ./shell_scripts/
- Generate logrotate configurations to ./logrotate_configs/
- Automatically add tasks to current user's crontab
- Save installation record to installed_tasks.json

2. Preview Generated Content (No file write)

```
# Preview all generated content
./logrotate-gen -dry-run

# Preview specified configuration, provided test.json configuration
file is in current directory
./logrotate-gen -dry-run -config ./test.json
```

Example output

```
=== SHELL SCRIPT: ./shell_scripts/alb-access.sh ===
#!/bin/bash
set -euo pipefail
shopt -s nullglob
...

=== LOGROTATE CONFIG: ./logrotate_configs/alb-error ===
# Auto-generated for task: alb-error
/path/to/alb/logs/error.log {
    daily
    rotate 30
    compress
    ...
}
```

3. List Installed Tasks

```
./logrotate-gen -list
```

Output example:

```
📅 Installed tasks (installed at: Mon Oct 27 10:00:00 CST 2025):
1. Name: alb-access
   Mode: shell
   Log File: /path/to/alb/logs/access.log
   Schedule: 0 2 * * *
   Retain Days: 14
   Compress: true

2. Name: alb-error
   Mode: logrotate
   Log File: /path/to/alb/logs/error.log
   Schedule: 0 1 * * * (default)
   Retain Days: 30
   Compress: true

📋 Current crontab entries for logrotate:
0 2 * * * /path/to/tool/shell_scripts/alb-access.sh # alb-access
0 1 * * * logrotate /path/to/tool/logrotate_configs/alb-error # alb-error
```

4. Uninstall All Tasks

```
./logrotate-gen -remove-all
```

After execution:

- Remove all entries added by this tool from crontab
- Delete shell_scripts/ and logrotate_configs/ directories
- Delete installed_tasks.json

> ⚠️ *This operation is irreversible, please use with caution!*

9.14 Traffic Control

ALB provides multiple ways to implement traffic control, including rate limiting, speed limiting, and connection limiting.

9.14.1 Use limit_req Module for Rate Limiting

The limit_req module allows you to limit client requests based on request frequency.

1. Directive name: `limit_req_zone`

- Syntax: limit_req_zone key zone=name:size rate= number r/s
- Default: no
- Area: http
- Usage example: limit_req_zone $binary_remote_addr zone=addr:10m rate=1r/s
- Description: Define a rate limiting zone, where $binary_remote_addr is the requesting client's IP address, zone=addr:10m indicates the memory size for this zone is 10MB, rate=1r/s indicates limiting each IP address to only one request per second.

2. Directive name: `limit_req`

- Syntax: limit_req zone=name [burst=number] [nodelay]
- Default: no
- Area: http, server, location
- Usage example: limit_req zone=mylimit burst=5 nodelay
- Description: Limit request rate in the specified zone, where burst=5 indicates the allowed burst request count is 5, nodelay indicates not delaying processing of requests exceeding burst.

9.14.1.1 Example Configuration

Suppose you want to limit each IP address to only 1 request per second:

```
http {
    limit_req_zone $binary_remote_addr zone=mylimit:10m rate=1r/s;

    server {
        listen 80;
        server_name example.com;

        location / {
            limit_req zone=mylimit burst=5 nodelay;
            proxy_pass http://backend;
```

```
        }
    }
}
```

- limit_req_zone: Define a rate limiting zone, where $binary_remote_addr is the client IP address, mylimit is the zone name, 10m is the memory size (used to store rate limiting information), rate=1r/s indicates at most 1 request per second.
- limit_req: Apply rate limiting rules in the location block. zone=mylimit specifies using the previously defined rate limiting zone, burst=5 allows burst requests, meaning more than 1 request can be sent in a short time, but cannot exceed the burst value; nodelay indicates not allowing delayed requests.

9.14.2 Use limit_conn Module for Connection Count Limiting

The limit_conn module can limit the number of connections per client.

1. Directive name: `limit_conn_zone`

- Syntax: limit_conn_zone key zone=name:size;
- Default: no
- Area: http
- Usage example: limit_conn_zone $binary_remote_addr zone=addr:10m;
- Description: Define a rate limiting zone, where key is the key used to identify the client (e.g., IP address), zone=name is the zone name, size is the memory size (used to store connection information).

2. Directive name: `limit_conn`

- Syntax: limit_conn zone number;
- Default: no
- Area: http, server, location
- Usage example: limit_conn addr 10;
- Description: Limit request rate in the specified zone, where zone is the previously defined zone name, number is the allowed maximum connection count.

9.14.2.1 Example Configuration

Suppose you want to limit each IP address to a maximum of 10 concurrent connections:

```
http {
    limit_conn_zone $binary_remote_addr zone=myconn:10m;

    server {
        listen 80;
```

```
        server_name example.com;

        location / {
            limit_conn myconn 10;
            proxy_pass http://backend;
        }
    }
}
```

- limit_conn_zone: Define a connection count limiting zone, where $binary_remote_addr is the client IP address, myconn is the zone name, 10m is the memory size (used to store connection information).
- limit_conn: Apply connection count limiting rules in the location block. zone=myconn specifies using the previously defined connection count limiting zone, 10 indicates a maximum of 10 concurrent connections allowed.

9.14.3 Use limit_rate Directive for Speed Limiting

The limit_rate directive can limit client download speed.

1. Directive name: `limit_rate`

- Syntax: limit_rate rate;
- Default: no limit
- Area: http, server, location
- Usage example: limit_rate 100k;
- Description: Set download speed limit for each connection, where rate is the speed (e.g., 100k indicates transmitting 100KB of data per second).

9.14.3.1 Example Configuration

Suppose you want to limit each client's download speed to 100k/s:

```
server {
    listen 80;
    server_name example.com;

    location / {
        limit_rate 100k;
        proxy_pass http://backend;
```

```
        }
}
```

- limit_rate: Apply speed limiting rules in the location block. 100k indicates a maximum transmission of 100KB of data per second.

9.15 Canary Release and Canary Testing

ALB supports canary release and canary testing functions, making it easy to test new versions and smoothly upgrade to production environments.

9.15.1 Scenario Introduction

Scenario	Requirement	Typical Example
New Feature Canary	Only let internal/whitelist users experience	New order interface only allows users with `uid=1000~2000` to access
A/B Testing	Compare two backend sets by traffic ratio	50% users go to `v1` service, 50% go to `v2` service
Region/Channel Canary	Route by request characteristics	Guangdong users go to new datacenter, others go to old datacenter
Canary Release	First release 5% traffic, error rate >1% auto rollback	Monitor `5xx` ratio, exceed threshold one-click switch back
UI/UX Redesign Testing	A/B groups see different interfaces, evaluate click rate etc.	
Failure Rollback Drill	Quick switch back to old version, ensure system availability	

9.15.2 ALB Key Directive Quick Reference

ALB itself does not directly provide "canary" functionality, but can be implemented by combining the following modules and directives:

- `map` directive: Generate variables based on request characteristics (like Cookie, Header, IP)
- `split_clients` directive: Split traffic by ratio based on hash value
- `upstream + server` : Define multiple backend service groups

Directive/Variable	Function	Example

`split_clients`	Consistent hash split by variable	`split_clients "${remote_addr}AAA" $group { 5% canary; 95% stable; }`
`map`	Read header, cookie, arg for conditional mapping	`map $cookie_ab_version $backend { default v1; canary v2; }`
`set $var` / `rewrite`	Modify variables at runtime	`set $backend ''; rewrite ^/api/(.*) /$1 break;`
`proxy_pass`	Forward traffic to corresponding upstream	`proxy_pass http://$backend;`
`access_log`	Log for easy rollback	`access_log /var/log/alb/canary.log main if=$log_canary;`

9.15.3 Key Directive Details

9.15.3.1 1. split_clients —— Split by Ratio (Recommended)

```
split_clients ${variable} $backend {
    10%     backend_v2;
    *       backend_v1;
}
```

- `${variable}` : Variable used for hashing, like $request_id, $remote_addr, $http_user_agent
- `$backend` : Output variable, used for proxy_pass
- `10%` : Traffic ratio, supports decimals (like 0.5%)
- `*` : Fallback, matches remaining traffic

✅ Pros: Simple, efficient, stateless

❌ Cons: Cannot precisely control based on user identity (unless variable is user ID)

9.15.3.2 2. map —— Route Based on Rules

```
map $http_x_version_flag $target_backend {
    default          backend_v1;
    "v2"             backend_v2;
    ~*beta           backend_v2;
}
```

- Route to v2 based on request header `X-Version-Flag: v2`
- Supports regex matching (`~*` means case-insensitive)

✅ Pros: Flexible, can combine with Cookie, Header, IP, etc.

❌ Cons: Requires client cooperation to pass identifier

3. upstream —— Define Backend Service Groups

```
upstream backend_v1 {
    server 192.168.1.10:8080;
}

upstream backend_v2 {
    server 192.168.1.11:8081;
}
```

Each upstream can contain multiple servers, supports load balancing Can work with weight, backup and other parameters

9.15.4 Configuration Example: Canary Release by IP Address and Ratio

Hash calculation based on client IP ($remote_addr), and assign approximately 5% of IPs to the canary group.

```
http {
    # 1. Define upstreams
    upstream stable { server 10.0.0.1:8080; }
    upstream canary { server 10.0.0.2:8080; }

    # 2. 5% canary by IP
    split_clients "${remote_addr}AAA" $is_canary {
        5%      1;      # Variable value 1 means go to canary
        *       0;
    }

    # 3. Select backend
    map $is_canary $backend {
        1       canary;
```

```
        0       stable;
    }

    server {
        listen 80;
        server_name api.example.com;

        location / {
            proxy_set_header Host $host;
            proxy_pass http://$backend;
            # Log for easy rollback
            access_log /var/log/alb/canary.log combined
if=$is_canary;
        }
    }
}
```

9.15.5 Cookie-based Canary

When users visit with Cookie: gray=true, they enter the canary environment.

```
# If Cookie has gray=true, go to new version
map $http_cookie $backend {
    default          old_app;
    ~*gray=true      new_app;
}

upstream old_app { server 10.0.0.10:8000; }
upstream new_app { server 10.0.0.11:8001; }

server {
    listen 80;
    location / {
        proxy_pass http://$backend;
```

```
    }
}
```

9.15.6 IP Whitelist Forced Canary (Internal Testing Solution)

```
upstream old_app { server 10.0.0.10:8000; }
upstream new_app { server 10.0.0.11:8001; }

map $remote_addr $backend {
    default           old_app;
    192.168.1.100     new_app;  # Internal testing IP
    10.10.0.0/16      new_app;  # Entire internal network segment
}
```

9.15.7 Dynamic Control of Canary Ratio or Database User Tag-based Routing

- Read user ID from request parameters (like ?user_id=123) or request headers (like X-User-ID: 123);
- Call Lua script to determine if the user belongs to canary users (e.g., users with even user IDs go to new version);
- Based on the determination result, proxy the request to old_app or new_app backend service;
- Support logging canary routing results for monitoring and troubleshooting.

```
http {

  log_format gray_log '$remote_addr - [$time_local] '
                      '"$request" $status $body_bytes_sent '
                      '"$http_referer" "$http_user_agent" '
                      'user_id=$user_id backend=$backend_used';


  upstream old_app { server 10.0.0.10:8000; }
  upstream new_app { server 10.0.0.11:8001; }

  server {
```

```
    listen 80;
    server_name localhost;

    # Custom variables for passing user ID and backend selection
    set $user_id "";
    set $backend_used "";

    location / {
      # 1. Get user_id from query string or header
      set_by_lua_block $user_id {
          local user_id = ngx.var.arg_user_id
          if not user_id or user_id == "" then
            user_id = ngx.var.http_x_user_id
          end
          return user_id or ""
      }
      # 2. Determine if canary user (user_id is even), no user ID
defaults to old version
      set_by_lua_block $target_backend {
          local user_id = ngx.var.user_id
          if user_id == "" then
            return "old_app"
          end

          local num = tonumber(user_id)
          if num and num % 2 == 0 then
            ngx.var.backend_used = "new_app"

            return "new_app"
          else
            ngx.var.backend_used = "old_app"

            return "old_app"
          end
      }
      # 3. Proxy to corresponding backend
```

```
        proxy_pass http://$target_backend;
        proxy_set_header Host $host;
        proxy_set_header X-Real-IP $remote_addr;
        proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    }

    # Access log includes canary information
    access_log logs/access.log gray_log;
  }
}
```

9.16 Dynamic DNS Resolution

ALB supports dynamic DNS resolution, enabling real-time resolution of domain names. The core of this feature is accomplished through the resolver directive combined with variables, as shown in the following example:

```
http {
    server {
        listen 80;
        # Declare DNS server address and validity period of resolution
results
        resolver 8.8.8.8 valid=10s;
        # Define variable for dynamic DNS resolution
        set  $test private.server1.com.cn;
        location / {
            # Use variable to implement dynamic DNS resolution
            proxy_pass http://$test;
        }
    }
}
```

In the above configuration, when accessing the server's root path /, the request will be forwarded to the backend address `http://private.server1.com.cn` defined by the `$test` variable. Since the variable `$test` is used, ALB will re-resolve the domain name through the DNS server specified by resolver (like 8.8.8.8) on each request (or after cache expires).

The validity period of the resolution result is specified by valid=10s, meaning cache for 10 seconds. After exceeding the validity period, the next access will trigger a new DNS query.

Important Note: If `proxy_pass` is followed directly by a domain name (not a variable), for example `proxy_pass http://private.server1.com.cn;`, then ALB only resolves the domain name once during startup or configuration reload, unable to achieve dynamic updates, thus cannot achieve dynamic DNS resolution effect.

9.16.1 resolver Configuration Details

Dynamic domain resolution relies on the combination of `resolver` directive and variables. `resolver` can be configured separately in `http`, `server`, or `location` blocks, with different scopes accordingly.

```
http {
    server {
            listen 80;
            set   $test  private.server1.com.cn;
            location / {
                    resolver 8.8.8.8 valid=10s;
                    proxy_pass http://$test;
            }
            location /duplicate/ {
                resolver 114.114.114.114 valid=10s;
                proxy_pass http://$test;
            }
    }
}
```

In this configuration, when accessing `/` and `/duplicate/` paths, although the proxied target domain is the same (both private.server1.com.cn), they use different DNS servers for resolution:

- `/` uses `8.8.8.8`
- `/duplicate/` uses `114.114.114.114`

And, the DNS resolution results for these two paths are independent and do not share cache.

Parameter description:

- `valid=10s`: Specify cache validity period for DNS resolution results;

- `ipv6=on|off` : Control whether to accept IPv6 addresses. Default is on, meaning when a domain resolves to both IPv4 and IPv6 addresses, both will be used. Can disable IPv6 resolution by setting ipv6=off.

9.17 HTTPS and Chinese National Cryptography

ALB implements secure HTTP communication by setting SSL certificates and private keys.

9.17.1 Prerequisites

- Obtain SSL certificate and private key, supports Chinese National Cryptography SSL certificates.
    - 1. Server encryption certificate file
    - 2. Server encryption certificate private key file
    - 3. Server signature certificate (Required for Chinese National Cryptography)
    - 4. Server signature certificate private key file (Required for Chinese National Cryptography)

9.17.2 Edit ALB Configuration File to Enable SSL

- Configuration instructions: `conf/alb.conf` file's server block content.
- Core configuration: `listen` , `server_name` , `ssl_certificate` , `ssl_certificate_key`
- Example configuration:

```
server {
    listen 443 ssl;    # Use SSL flag to enable https on current port
    server_name your_domain.com;    # Domain corresponding to SSL
certificate

    ssl_certificate /path/to/your_domain_name.enc.crt.pem;      #
Server encryption certificate file
    ssl_certificate_key /path/to/your_domain_name.enc.key.pem;  #
Server encryption certificate private key file

    ssl_protocols TLSv1.2 TLSv1.3; # Use more secure protocol
versions
    ssl_prefer_server_ciphers on;  # Prefer server-defined cipher
suites
    ssl_ciphers HIGH:!aNULL:!MD5;  # Use more secure encryption
algorithms
```

```
    location / {
        root /var/www/html;
        index index.html index.htm;
    }
}
```

- listen: Specify the listening port, here set to 443, indicating HTTPS protocol is used.
- server_name: Specify the server name, here set to your_domain.com, indicating the domain this server corresponds to.
- ssl_certificate: Specify the SSL certificate path, here set to /path/to/your_domain_name.crt, indicating the certificate file.
- ssl_certificate_key: Specify the SSL private key path, here set to /path/to/your_domain_name.key, indicating the private key file.
- ssl_protocols: Specify supported SSL protocol versions, here set to TLSv1.2 and TLSv1.3, indicating using more secure protocol versions.
- ssl_prefer_server_ciphers: Specify using stronger ciphers, indicating using more secure encryption algorithms.
- ssl_ciphers: Specify supported encryption algorithms, here set to HIGH:!aNULL:!MD5, indicating using more secure encryption algorithms.

9.17.3 Configuration Instruction Description

9.17.3.1 listen

- Description: Specify the port and protocol the server listens on.
- Example: listen 443 ssl;

9.17.3.2 ssl_certificate and ssl_certificate_key

- Description: Specify the SSL certificate path and private key path.
- Example: ssl_certificate /path/to/your_domain_name.crt;

9.17.3.3 ssl_protocols

- Description: Specify supported SSL protocol versions.
- Example: ssl_protocols TLSv1.2 TLSv1.3; (Recommended to use TLS1.2 and TLS1.3)

9.17.3.4 ssl_ciphers

- Description: Specify stronger ciphers and supported encryption algorithms.
- Example: ssl_ciphers HIGH:!aNULL:!MD5; (Recommended to use stronger ciphers)

9.17.3.5 ssl_prefer_server_ciphers

- Description: Prefer server-defined cipher suites.
- Example: ssl_prefer_server_ciphers on;

9.17.3.6 ssl_session_cache

- Description: Enable SSL session caching to reduce SSL connection handshake count.
- Example: ssl_session_cache shared:SSL:10m;

9.17.3.7 ssl_session_timeout

- Description: Set SSL session cache expiration time.
- Example: ssl_session_timeout 10m;

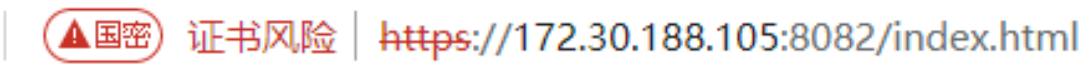
9.17.4 Chinese National Cryptography Configuration Example

Note: Chinese National Cryptography certificate and key file naming must contain signature certificate (sig) and server certificate (enc), otherwise they cannot be recognized. Also, sig certificate must be configured first, as shown in the configuration below:

```
server {
    listen 443 ssl;    # Use SSL flag to enable https on current port
    server_name your_domain.com;    # Domain corresponding to SSL
certificate

    # Chinese National Cryptography server signature certificate and
key, usually name contains sig (sig certificate must be configured
first)
    ssl_certificate /path/to/your_domain_name.sig.crt.pem;      #
Server signature certificate file
    ssl_certificate_key /path/to/your_domain_name.sig.key.pem;  #
Server encryption certificate private key file

    # Chinese National Cryptography server certificate and key,
usually name contains enc (enc certificate goes after sig
certificate)
    ssl_certificate /path/to/your_domain_name.enc.crt.pem;      #
Server encryption certificate file
    ssl_certificate_key /path/to/your_domain_name.enc.key.pem;  #
Server encryption certificate private key file

    ssl_protocols TLSv1.2 TLSv1.3; # Use more secure protocol
versions
    ssl_prefer_server_ciphers on;  # Prefer server-defined cipher
```

```
suites
    ssl_ciphers HIGH:!aNULL:!MD5;  # Use more secure encryption
algorithms

    location / {
        root /var/www/html;
        index index.html index.htm;
    }
}
```

Access using Chinese National Cryptography browser, the address bar shows 国密.



Welcome to alb!

If you see this page, the alb web server is successfully installed and working.
Further configuration is required.

For online documentation and support please refer to apusic.com.
Commercial support is available at apusic.com.

Thank you for using alb.

9.17.5 HTTP3

ALB V2.0.5 and above versions support HTTP3 protocol. When using HTTP3 protocol, please ensure the client (browser) supports HTTP3 protocol.

To ensure compatibility with existing protocols, refer to the following HTTP3 configuration:

```
server {
    listen 443 ssl;   # Use SSL flag to enable https on current port
```

```
    listen 443 quic reuseport;    # Use quic flag to enable http3 on
current port

    server_name your_domain.com;    # Domain corresponding to SSL
certificate

    ssl_certificate /path/to/your_domain_name.crt;      #
Certificate file
    ssl_certificate_key /path/to/your_domain_name.key;  # Private
key file

    ssl_protocols TLSv1.3; # Use more secure protocol version, HTTP3
requires TLSv1.3
    ssl_prefer_server_ciphers on;  # Prefer server-defined cipher
suites
    ssl_ciphers HIGH:!aNULL:!MD5;  # Use more secure encryption
algorithms

    # Tell browser: same port supports HTTP/3, if not port 443,
request modification matching listening port.
    add_header Alt-Svc 'h3=":443"; ma=86400';

    location / {
        root /var/www/html;
        index index.html index.htm;
    }
}
```

Test using curl tool that supports http3:

```
 root@root:~$ /snap/bin/curl --http3-only -I
https://localhost:443/index.html -v -k
* Host localhost:443 was resolved.
* IPv6: ::1
* IPv4: 127.0.0.1
*   Trying [::1]:443...
```

```
* error:8000006F:system library::Connection refused
* QUIC connect to ::1 port 443 failed: Could not connect to server
*   Trying 127.0.0.1:443...
* Server certificate:
*  subject: CN=localhost
*  start date: Aug 25 10:23:08 2025 GMT
*  expire date: Aug 25 10:23:08 2026 GMT
*  issuer: CN=localhost
*  SSL certificate verify result: self-signed certificate (18),
continuing anyway.
*   Certificate level 0: Public key type RSA (2048/112
Bits/secBits), signed using sha256WithRSAEncryption
* Connected to localhost (127.0.0.1) port 443
* using HTTP/3
* [HTTP/3] [0] OPENED stream for https://localhost:443/index.html
* [HTTP/3] [0] [:method: HEAD]
* [HTTP/3] [0] [:scheme: https]
* [HTTP/3] [0] [:authority: localhost:443]
* [HTTP/3] [0] [:path: /index.html]
* [HTTP/3] [0] [user-agent: curl/8.15.0]
* [HTTP/3] [0] [accept: */*]
> HEAD /index.html HTTP/3
> Host: localhost:443
> User-Agent: curl/8.15.0
> Accept: */*
>
* Request completely sent off
< HTTP/3 200
HTTP/3 200
< server: alb/2.0.5
server: alb/2.0.5
< date: Tue, 26 Aug 2025 08:37:04 GMT
date: Tue, 26 Aug 2025 08:37:04 GMT
< content-type: text/html
content-type: text/html
< content-length: 617
```

```
content-length: 617
< last-modified: Fri, 22 Aug 2025 08:05:21 GMT
last-modified: Fri, 22 Aug 2025 08:05:21 GMT
< etag: "68a824c1-269"
etag: "68a824c1-269"
< alt-svc: h3=":443"; ma=86400
alt-svc: h3=":443"; ma=86400
< accept-ranges: bytes
accept-ranges: bytes
<

* Connection #0 to host localhost left intact
```

9.18 Forward Proxy

ALB can be used as a forward proxy server, it can help clients access other servers or services while hiding the client's real IP address. The main purposes of forward proxy include caching, load balancing, security filtering, etc.

9.18.1 Example Configuration

Below is a simple ALB configuration example supporting http and https forward proxy, used to forward requests to another server:

```
server {
    listen                          8080;
    server_name                     localhost;
    resolver                        114.114.114.114 ipv6=off;
    proxy_connect;
    proxy_connect_allow             443 80;
    proxy_connect_connect_timeout   10s;
    proxy_connect_read_timeout      10s;
    proxy_coneect_send_timeout      10s;
    location / {
        proxy_pass $scheme://$http_host$request_uri;
    }
}
```

- resolver: Set DNS resolution server, here using 114.114.114.114.
- proxy_connect: Enable proxy connection function.
- proxy_connect_allow: Allowed port numbers, here 443 and 80.
- proxy_connect_connect_timeout: Connection timeout, here 10 seconds.
- proxy_connect_read_timeout: Read timeout, here 10 seconds.
- proxy_coneect_send_timeout: Send timeout, here 10 seconds.

In the location block, use $scheme, $http_host and $request_uri variables to construct the target server address.

- location /: Configure the path to handle all requests, forwarding requests to the target server.
- $scheme: Indicates the protocol used for the request (http or https).
- $http_host: Indicates the hostname and port number of the request.
- $request_uri: Indicates the request URI.

10 High Availability Cluster Setup

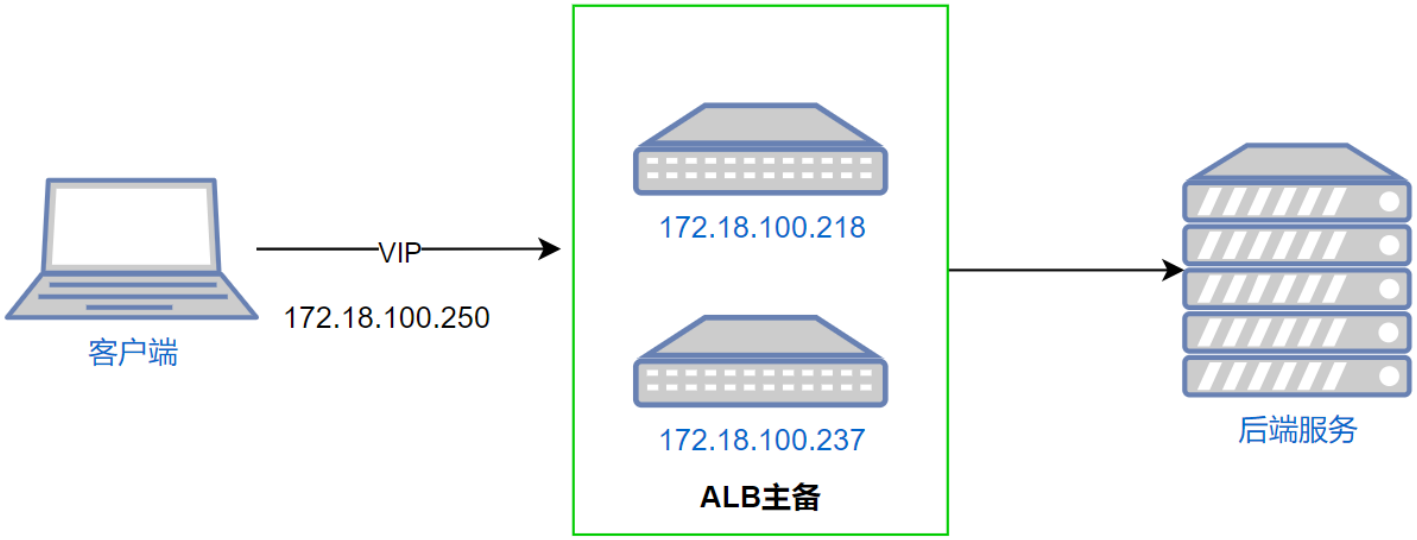
ALB supports two high availability methods: native high availability and keepalived. Set up a high availability cluster, when a cluster node fails, traffic automatically switches to the backup node.

In ALB console, one-click configure and start high availability. Below introduces the installation and configuration methods on the command line.

10.1 Prerequisites

1. Two servers, one as Master node, one as Backup node.
2. Deploy ALB service on both servers. (Installation process omitted)
3. In the LAN of both servers, prepare an unused IP address as virtual IP (VIP).
4. Ensure normal network communication between the two servers.
5. Ensure firewalls on both servers allow keepalived and ALB service communication.
6. Install and configure keepalived.
7. Verify VIP drift.

Below is an example with two servers (172.18.100.218 and 172.18.100.237), selecting VIP as 172.18.100.250.



As shown above, by setting up two ALBs and configuring VIP, clients access ALB through VIP. When the ALB node pointed to by VIP goes down, VIP automatically switches to the backup node.

10.2 Native High Availability

ALB comes with high availability components, can one-click deploy and start ALB. In ALB console high availability configuration, native high availability components are used by default.

10.2.1 View Physical Network Interface Name

1. Execute the following command on both master and backup nodes to view the physical network interface name of the current machine's IP:

```
ip addr show
```

2. Record the physical network interface name, for example: eth0.

10.2.2 Configure aha

Master node

1. Role configuration: master
2. Modify VIP address
3. Modify network interface name

Backup node

1. Role configuration: backup
2. Modify VIP address
3. Modify network interface name

10.2.2.1 Master Node

1. Switch to utils/aha directory, edit config.yaml file, as shown in the example below:

```
keepalived:
  # Virtual router ID
  vroute_id: 239

  # Virtual IP binding network interface name
  interface: eth0

  # Virtual IP address
  vip: 172.18.100.250

  # Protocol type, options are ipv4 and ipv6
  protocol: ipv4

  # Whether preemptive mode
```

```
  #If preemptive mode is enabled (Preempt Mode), when a higher
priority router joins the VRRP group, it can replace the current
active router to become the new active router.
  #If preemptive mode is not enabled, even if a higher priority
router joins, the current active router will not be replaced
  preempt: true

  # Message sending interval (milliseconds)
  msg-send-interval: 800

  # Priority, 0-255
  priority: 100

  # Role, options are master and backup
  role: master

checker:

  # Service status check time interval (milliseconds)
  check-interval: 1000

  # Retry count
  retry-count: 3

  # Retry interval (milliseconds)
  retry-interval: 2000

  # Health check method, can be url or shell, url is http or https,
shell is shell command
  health-type: url

  # Current target service status check url, used to check if target
service is healthy
  health-url: http://localhost:8080/node_status

  # Custom health check returned url status codes
```

```
  health-codes:
    - 200
    - 404

  # Shell health check command, shell command execution returns 0
means healthy, other values mean abnormal
  health-cmd:

  # Whether to attempt to restart target service when node fails
(default is false)
  restart-on-failure: false
  # Restart target service command
  restart-cmd:

aha:
  # Log file path
  log-file: aha.log

  # Log level, options are debug, info, warn, error
  log-level: info
```

10.2.2.2 Backup Node

```
keepalived:
  # Virtual router ID
  vroute_id: 239

  # Virtual IP binding network interface name
  interface: eth0

  # Virtual IP address
  vip: 172.18.100.250

  # Protocol type, options are ipv4 and ipv6
  protocol: ipv4
```

```
  # Whether preemptive mode
  #If preemptive mode is enabled (Preempt Mode), when a higher
priority router joins the VRRP group, it can replace the current
active router to become the new active router.
  #If preemptive mode is not enabled, even if a higher priority
router joins, the current active router will not be replaced
  preempt: true

  # Message sending interval (milliseconds)
  msg-send-interval: 800

  # Priority, 0-255
  priority: 100

  # Role, options are master and backup
  role: backup

checker:

  # Service status check time interval (milliseconds)
  check-interval: 1000

  # Retry count
  retry-count: 3

  # Retry interval (milliseconds)
  retry-interval: 2000

  # Health check method, can be url or shell, url is http or https,
shell is shell command
  health-type: url

  # Current target service status check url, used to check if target
service is healthy
  health-url: http://localhost:8080/node_status
```

```
  # Custom health check returned url status codes
  health-codes:
    - 200
    - 404

  # Shell health check command, shell command execution returns 0
means healthy, other values mean abnormal
  health-cmd:

  # Whether to attempt to restart target service when node fails
(default is false)
  restart-on-failure: false
  # Restart target service command
  restart-cmd:

aha:
  # Log file path
  log-file: aha.log

  # Log level, options are debug, info, warn, error
  log-level: info
```

10.2.3 Register System Service and Start System Service

Both master and backup nodes need to execute the following operations:

1. Switch to sys-service directory
2. Switch to root user, or use sudo to execute the following command
3. Execute: `./setup-aha-service.sh` to automatically register system service
4. Start: `systemctl start aha.service`

10.2.4 Verify VIP Automatic Drift Test Steps

1. Use VIP 172.18.100.250 to access ALB normally.
2. Stop ALB on the master node, continue using VIP to access ALB, verify if it works normally.

10.2.5 Other Configuration Notes:

1. Custom health check URL: Modify health-url: http://localhost:8080/node_status in the configuration file
2. Custom URL health HTTP status codes: Modify health-codes: 200, 404 in configuration

3. Configure aha.log log file path: Modify log-file: aha.log in configuration file
4. Implement health check through custom shell command or script, requiring return 0 means healthy, other values mark as unhealthy in ALB, as shown in the example:

```
# Use shell command for health check
health-type: shell
# Use shell command to check if alb process exists then healthy
health-cmd: ps aux | grep alb | grep -v grep
```

10.3 Use keepalived to Implement High Availability

10.3.1 Install keepalived

```
# kylin, opensuler, centos operating systems
yum install -y keepalived

# uos, ubuntu operating systems
apt-get install -y keepalived
```

10.3.2 View Physical Network Interface Name

1. Execute the following command on both master and backup nodes to view the physical network interface name:

```
ip addr show
```

2. Record the physical network interface name, for example: eth0.

10.3.3 Configure keepalived

1. Edit the master node (Master) keepalived.conf file:

```
vi /etc/keepalived/keepalived.conf
```

Add the following content to the master node's /keepalived.conf file:

Note:

- Replace `interface eth0` with the master node's physical network interface name.
- Replace `172.18.100.250` with the prepared virtual IP address.

```
! Configuration File for keepalived

global_defs {
   router_id alb
}

vrrp_script chk_http_port {
   script "/etc/keepalived/checkalb.sh"
   interval 2 #(Detection script execution interval)
   weight 2
}

vrrp_instance VI_1 {
    state MASTER
    interface eth0
    virtual_router_id 51
    # Master and backup must have the same virtual_router_id
    priority 100
    # Master and backup have different priorities, master has higher
value, backup has lower value
    advert_int 1
    authentication {
        auth_type PASS
        auth_pass 1111
    }
    virtual_ipaddress {
        # Please modify this virtual IP address as needed
        172.18.100.250
    }
    track_script {
        chk_http_port
```

```
    }
}
```

2. Edit the backup node (Backup) keepalived.conf file:

```
vi /etc/keepalived/keepalived.conf
```

Add the following content to the backup node's keepalibed.conf file:

Note:

- Replace `interface eth0` with the backup node's physical network interface name.
- Replace `172.18.100.250` with the prepared virtual IP address.

```
! Configuration File for keepalived
global_defs {
    router_id alb
}
vrrp_script chk_http_port {
    script "/etc/keepalived/checkalb.sh"
    interval 2 #(Detection script execution interval)
    weight 2
}
vrrp_instance VI_1 {
    state BACKUP
    # state MASTER
    # Change MASTER to BACKUP on backup server
    interface eth0
    virtual_router_id 51
    # Master and backup must have the same virtual_router_id
    priority 90
    # Master and backup have different priorities, master has higher
value, backup has lower value
    advert_int 1
    authentication {
        auth_type PASS
```

```
        auth_pass 1111
    }
    virtual_ipaddress {
        172.18.100.250 # Please modify this virtual IP address as
needed
    }
    track_script {
        chk_http_port
    }
}
```

3. Create detection script checkalb.sh on both nodes:

```
vi /etc/keepalived/checkalb.sh
```

Add the following content to checkalb.sh file:

```
#!/bin/bash
alb_count=$(ps -ef|grep "alb: main process" | grep -v grep |wc -l)
#1. Determine if ALB is alive, if not alive stop keepalived
if [ $alb_count -eq 0 ];then
    sleep 3
    #2. Wait 3 seconds then get alb status again
    alb_count=$(ps -ef|grep "alb: main process" | grep -v grep |wc -
l)
    #3. Judge again, if alb still not alive then stop Keepalived to
let address drift, and exit script
    if [ $alb_count -eq 0 ];then
        echo "alb is down"
        exit 1
    fi
fi
```

After creating the detection script, add execute permission to checkalb.sh:

```
chmod +x /etc/keepalived/checkalb.sh
```

10.3.4 Start keepalived service on both master and backup nodes

```
systemctl start keepalived.service
```

10.3.5 Verify VIP points to master node

On the master node, view the virtual IP address (change eth0 to master node's network interface name):

```
ip addr show eth0 |grep inet|grep -v inet6|awk '{print $2}'
```

10.3.6 Stop master node alb, verify if VIP drifts to backup node

```
# Switch to alb installation directory
./bin/stop-alb.sh
```

On the backup node, view the virtual IP address (change eth0 to backup node's network interface name):

```
ip addr show eth0 |grep inet|grep -v inet6|awk '{print $2}'
```

If VIP points to the master node, it means keepalived configuration is successful.

11 ALB Proxy Security Configuration

11.1 General Security Configuration

11.1.1 Hide ALB Version Information

```
http{
    more_clear_headers 'Server';  # Add this line in http block
}
```

11.1.2 Restrict Request Methods

Only allow necessary HTTP methods (like GET, POST, HEAD, PUT):

```
http {
    server {
        if ($request_method !~ ^(GET|HEAD|POST|PUT)$) {
            return 405;
        }
    }
}
```

11.1.3 Limit Client Request Size

Prevent DoS attacks (like large file uploads, extra long URLs):

```
http{
    client_max_body_size 1M;        # Limit request body
    client_header_buffer_size 1k;   # Request header buffer
    large_client_header_buffers 2 1k;
}
```

11.1.4 Set Reasonable Timeout

Prevent slow attacks (Slowloris etc.)

```
http{
    client_body_timeout 10s;
    client_header_timeout 10s;
    keepalive_timeout 5s;
    send_timeout 10s;
}
```

11.1.5 Enable HTTPS and Force Redirect

```
server {
    listen 80;
    server_name example.com;
    return 301 https://$host$request_uri;
}

server {
    listen 443 ssl http2;
    ssl_certificate /path/to/cert.pem;
    ssl_certificate_key /path/to/privkey.pem;

    ssl_protocols TLSv1.2 TLSv1.3;
    ssl_ciphers
ECDHE+AESGCM:DHE+AESGCM:AES256+EECDH:AES256+EDH:!aNULL:!MD5:!DSS;
    ssl_prefer_server_ciphers off;
    ssl_session_cache shared:SSL:10m;
    ssl_session_timeout 10m;
}
```

11.2 Reverse Proxy Security Configuration

11.2.1 Clean/Rewrite Request Headers

Prevent header injection or information leakage:

```
http{
    server {
        proxy_set_header Host $host;
        proxy_set_header X-Real-IP $remote_addr;
        proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
        proxy_set_header X-Forwarded-Proto $scheme;

        # Clear headers client might forge
        proxy_set_header X-Original-URI "";
        proxy_set_header X-Internal-Secret "";
    }
}
```

11.2.2 Limit Backend Response Headers

Avoid backend leaking sensitive information (like Server, X-Powered-By): Can hide through proxy_hide_header:

```
http {
    server {
        proxy_hide_header Server;
        proxy_hide_header X-Powered-By;
        proxy_hide_header X-AspNet-Version;
    }
}
```

11.2.3 Limit Proxy Request Rate

Prevent CC attacks

```
http {
    server {
        limit_req_zone $binary_remote_addr zone=api:10m rate=10r/s;
        location /api/ {
            limit_req zone=api burst=20 nodelay;
            proxy_pass http://backend;
        }
```

```
    }
}
```

11.3 Static Resource Service Specific Security Configuration

11.3.1 Disable Directory Listing

Ensure `autoindex on;` is not configured, default is off.

11.3.2 Restrict Accessible File Types

Set according to static resource type, only allow specific extensions (like .html, .css, .js, .png):

```
location ~ \.(php|pl|py|jsp|asp|sh|cgi)$ {
    return 403;
}
```

11.3.3 Prevent Sensitive File Leakage

```
http{
    server {
        location ~ /\.(env|git|ht|svn|well-known/acme-challenge) {
            deny all;
        }
    }
}
```

11.3.4 Set Secure Content Security Policy (CSP) and Other Security Headers

```
add_header X-Content-Type-Options "nosniff" always;
add_header X-Frame-Options "DENY" always;
add_header X-XSS-Protection "1; mode=block" always;
add_header Referrer-Policy "strict-origin-when-cross-origin" always;
add_header Permissions-Policy "geolocation=(), microphone=(),
camera=()" always;
```

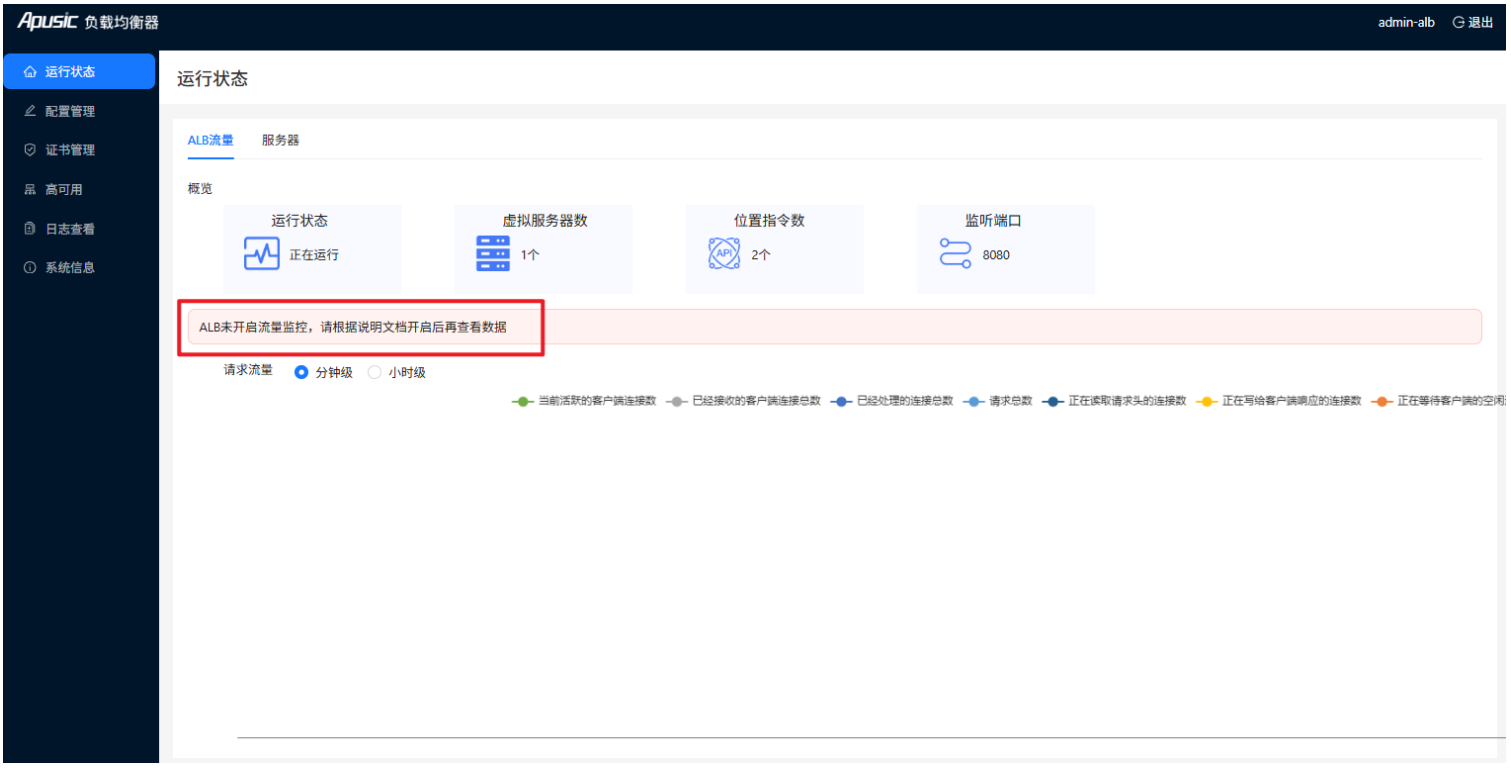
```
# CSP example (adjust according to actual)
add_header Content-Security-Policy "default-src 'self'; script-src
'self' 'unsafe-inline' https://trusted.cdn.com; style-src 'self'
'unsafe-inline'; img-src 'self' data:; font-src 'self'; object-src
'none'; base-uri 'self'; form-action 'self';" always;
```

12 Product Common Issues

Note: Performance related errors refer to [Performance Optimization] manual.

12.1 Console Enable Running Traffic Monitoring

After starting ALB Standard Edition and logging into the console, the following prompt appears:



Then you need to manually modify conf/alb.conf file, add the following content in any server block

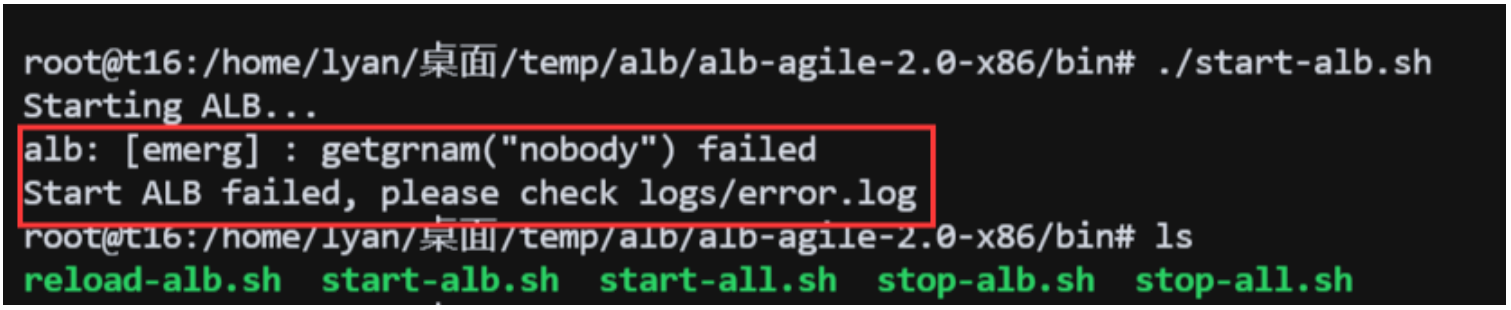
```
server {

  # Add the following content
  location /node_status {
      stub_status on;
      access_log off;
      allow 127.0.0.1;
  }
}
```

- Add the above location block in any server block.

- After adding the location block, save and exit.
- Reload alb: `./bin/reload_alb.sh` .
- Refresh the page.

12.2 Startup Failure: getgrnam("nobody") failed

The following error appears during startup:



Fix method:

Modify the first line comment in conf/alb.conf file, change `#user nobody;` to `user root;`

```
user root;
```

12.3 Docker Container Startup Failure

After startup fails, you can use docker logs to view container logs.

1. Get ALB container ID

```
docker ps -a
CONTAINER ID        IMAGE                 COMMAND
CREATED             STATUS
     PORTS               NAMES
c9fcace189a3        alb-agile:V2.0.5     "bash /opt/ALB-V2...."   17
seconds ago      Exited (1) 16 seconds ago
alb-v202-se-docker-amd64-alb-1
```

As shown above, the ALB container ID is `c9fcace189a3`

2. View container logs

Use docker logs to view logs, as shown in the example:

```
#docker logs 48c60b6fced6
Starting ALB...
alb: [emerg] : open() "/opt/ALB-V2.0.5-SE/conf/alb.conf" failed (13:
Permission denied)
Start ALB failed, please check logs/error.log
```

3. docker startup Permission denied error

Error cause: The process inside the container does not have sufficient permissions to access files and directories in the mounted volumes.

Solution:

- Modify `alb-standard-dockercompose.yaml`, mark mounted paths with `:z` flag

```
version: '3'
services:
  alb:
    image: alb-agile:V2.0.5
    ports:
      - 8080:8080
      - 8887:8887
    volumes:
      - ./alb/alb.conf:/opt/ALB-V2.0.5-SE/conf/alb.conf:z
      - ./alb/license.xml:/opt/ALB-V2.0.5-SE/license.xml:z
      - ./alb/logs:/opt/ALB-V2.0.5-SE/logs:z
    command: bash /opt/ALB-V2.0.5-SE/bin/start-alb-and-console.sh
```

As shown above, add `:z` flag at the end of each mounted path.

- Restart container

`docker-compose -f alb-standard-dockercompose.yaml up -d`

12.4 When Starting ALB, It Stops After Displaying License Information

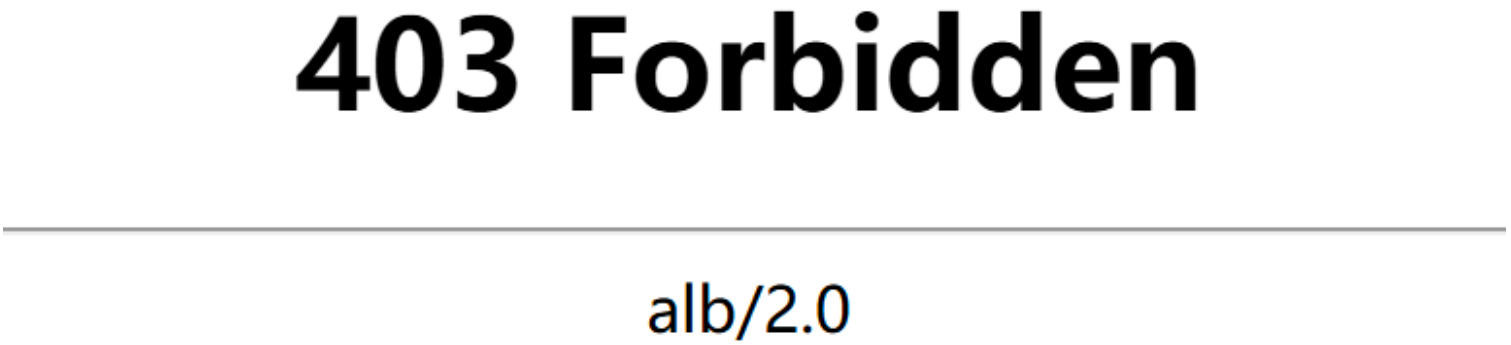
After executing ALB startup, the terminal displays license information and then stops, does not automatically exit the startup script, as shown below:

```
./bin/start-alb.sh
Starting ALB...
      ___                          _          Apusic Load Balancer
     /   |  ____  __  _______(_)____    Edition:Agile Edition
    / /| | / __ \/ / / / ___/ / ___/    License start: 2025-02-21
   / ___ |/ /_/ / /_/ (__  ) / /__      License end: 2025-06-31
  /_/  |_/ .___/\__,_/____/_/\___/      IP granted: 255.255.255.255
        /_/                             Licensee: 金蝶天燕研发测试

  version: V2.0.5
```

- Phenomenon: After executing the startup script, it does not exit script execution, and does not output `ALB are running now!` etc. prompts
- Cause analysis: ALB foreground started, not background started
- Solution: In conf/alb.conf configuration file, check if `daemon off;` configuration exists, if so, delete it, then restart ALB.

12.5 Access Page Shows 403 Error

After configuring ALB, the access page shows 403 error, as shown below:



- Phenomenon: Accessing any page (static resources) shows 403 error.

- Cause analysis: ALB startup user does not have read permission for corresponding static resources, causing 403 error.
- Solution: In the first line of conf/alb.conf configuration file, change `user nobody;` to `user root;` or modify to a username that has access permission for corresponding static resources, finally restart ALB.

12.6 AAS Login Failure

- Phenomenon: Using ALB to proxy multiple AAS services, after entering username and password and clicking login page, login failure occurs or redirects to login page.
- Cause analysis:
  - Session inconsistency: Browser visits send different requests to different AAS nodes, while login session is only on one of the AAS servers.
  - Request header or cookie loss: AAS server service depends on request headers or cookies to verify if client is logged in, if request header or cookie is lost, cannot verify if client is logged in.
  - websocket connection failure: Some services establish websocket connection after login, if websocket connection fails, cannot verify if client is logged in.
- Solution:
  - Session inconsistency: ALB uses ip_hash or sticky load balancing algorithm.
  - Request header or cookie loss: Configure forwarding all request headers and cookies

```
location / {

  proxy_pass http://backend/;

  # The following is newly added configuration
  proxy_cookie_path / /;  # Ensure Cookie path is correct
  proxy_pass_header Set-Cookie;


  proxy_set_header Host $host;
  proxy_set_header X-Real-IP $remote_addr;
  proxy_set_header X-Forwarded-For
$proxy_add_x_forwarded_for;
  proxy_set_header X-Forwarded-Proto $scheme;
```

```
}
```

- websocket connection failure: Write separate location configuration proxy for websocket connection address

```
location /websocket_url {
  proxy_pass http://backend/websocket_url;
       proxy_pass http://backend/efiles/;

    # WebSocket necessary configuration
    proxy_http_version 1.1;
    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";

    # Set websocket connection read timeout to 10
minutes, modify time according to business
    proxy_read_timeout 600s;
    # Set websocket connection write timeout to 10
minutes, modify time according to business
    keepalive_timeout 600s;

    proxy_cookie_path / /;  # Ensure Cookie path is
correct
    proxy_pass_header Set-Cookie;

    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For
$proxy_add_x_forwarded_for;
```

```
    proxy_set_header X-Forwarded-Proto $scheme;
}
```

12.7 After One Node of Backend Reverse Proxy Service Goes Down, Service Becomes Unaccessible, But Other Nodes Are Normal

- Phenomenon: ALB reverse proxies service nodes A, B, C, when A goes down or crashes, but B, C services are normal, accessing ALB at this time shows short-time unavailability.
- Cause analysis: ALB connection to already down A service causes timeout leading to entire service unavailable. In network, A service going down may cause ALB to wait too long connecting to A service, causing service unavailable during this period.
- Solution: Modify ALB connection timeout to upstream service, default is 60 seconds, modify to 10 seconds or less, meanwhile enable active health check to make ALB no longer forward requests to downed service, below is reference example

```
upstream backend {
  sticky; # Use session affinity load balancing algorithm or ip_hash
  server 192.168.1.1:8080 max_fails=3 fail_timeout=10s;
  server 192.168.1.2:8080 max_fails=3 fail_timeout=10s;
  server 192.168.1.3:8080 max_fails=3 fail_timeout=10s;

  # Configure active health check (refer to active health check
chapter for specific configuration)
  check timeout=1000 fall=3 rise=2 type=http interval=3000;
  check_http_expect_alive http_2xx  http_3xx  http_4xx;
}

http {
  server {
    location / {
      proxy_pass http://backend/;
      # Core configuration, shorten service connection timeout (but
errors may occur under high concurrency, set reasonably according to
concurrency)
      proxy_connect_timeout 3s;
```

```
    }
  }
}
```

12.8 Unified Authorization Center Authorization Startup Failure

- Phenomenon: Using unified authorization center authorization method startup fails, failure error message as follows:

```
alb: [emerg]: center auth: request to center fault, err: send auth
auth info to authserver error
```

- Cause analysis: Authorization center update causes ALB request parsing failure
- Solution: Update to ALB version released in 2025.

12.9 502 Error: no live upstreams while connecting to upstream

- Phenomenon: Frontend access shows 502 error, and ALB error log shows large amount of `no live upstreams while connecting to upstream`
- Cause analysis: In ALB reverse proxy, if upstream node response time exceeds `proxy_connect_timeout`, `proxy_send_timeout`, `proxy_read_timeout`, then the node will be marked as unavailable, and with `max_fails` default value of 1 in upstream configuration, this causes ALB unable to access the node showing the above error.
- Solution: Modify `proxy_connect_timeout`, `proxy_send_timeout`, `proxy_read_timeout` to longer time (over 60s), or set `max_fails` to 3, indicating not to mark node as unavailable.
- Configuration example:

```
upstream gateway_api {
    # Add max_fails and fail_timeout parameters
    server 127.0.0.1:9099 max_fails=3 fail_timeout=15s;
    server 127.0.0.2:9099 max_fails=3 fail_timeout=15s;
}

server {
  location /api/ {
    proxy_pass http://gateway_api/;
```

```
    # Increase timeout parameters
    proxy_connect_timeout 15s;
    proxy_send_timeout 60s;
    proxy_read_timeout 60s;
  }
}
```

12.10 Console Access Failure: `Invalid Host Request`

- Phenomenon: Accessing console shows `Invalid Host Request` error: `{"code":7,"data":null,"msg":"非法Host请求"}`
- Cause analysis: This is caused by console security policy, only allowing access IP entry to be local IP address, if using proxy/docker environment this error will occur
- Solution: Modify console configuration `[ALB installation directory]/console/conf/config.yaml` and set `docker` item under `system` node to `true`

```
system:
    # System environment setting
    env: public
    # System port setting
    addr: 8887
    # System route global prefix
    routerprefix: "/api/alb/console"
    # Use https
    https: false
    certfile: "./cert/cert.pem"
    keyfile: "./cert/key.key"
    # Whether to force first login password change, default
force (force does not affect default account)
    change-pwd-at-first: true
    # Whether it is docker running mode
    docker: true     # Modify this item to true
```

After configuration, restart the console service

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