Alibaba Cloud
Web Application Firewall

Best Practices

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Generic conventions

Table -1: Style conventions

Style	Description	Example
	This warning information indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.	Danger: Resetting will result in the loss of user configuration data.
	This warning information indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results.	Warning: Restarting will cause business interruption. About 10 minutes are required to restore business.
	This indicates warning information, supplementary instructions, and other content that the user must understand.	Notice: Take the necessary precautions to save exported data containing sensitive information.
	This indicates supplemental instructions, best practices, tips, and other content that is good to know for the user.	Note: You can use Ctrl + A to select all files.
>	Multi-level menu cascade.	Settings > Network > Set network type
Bold	It is used for buttons, menus, page names, and other UI elements.	Click OK.
Courier font	It is used for commands.	Run the `cd /d C:/windows` command to enter the Windows system folder.
Italics	It is used for parameters and variables.	`bae log list --instanceid` *Instance_ID*
[] or [a|b]	It indicates that it is a optional value, and only one item can be selected.	`ipconfig` *[-all|-t]*

Style	Description	Example
{} or {a|b}	**It indicates that it is a required value, and only one item can be selected.**	`swich` *{stand | slave}*

Contents

1 Web vulnerability protection suggestion

2 Protect your origin server

If the IP address of your origin server is disclosed, an attacker may exploit it to bypass Alibaba Cloud WAF and start direct-to-origin attacks against your origin server. To prevent such attacks, you can configure a security group (ECS origins) or whitelist (SLB origins) in your origin server.

Context

> 📋 **Note:**
>
> You are not required to do the configuration described in this topic. But we recommend that you do so to eliminate the possible risk arises from IP exposure.

You can verify if such a risk exists in your origin server as follows.

Use Telnet to establish a connection from a non-Alibaba Cloud host to the listener port of your origin server's public IP address. Check if the connection is successful. If the connection succeeds, your origin server faces an exposure risk. Once a hacker obtain the public IP address, he or she can bypass WAF to reach your origin server. If the connection fails, your origin server is secure.

For example, test the connection to port 80 and 800 of your WAF-enabled origin server IP. If the connection is successfully established, your origin server is insecure.

```
Last login: Tue Jul 31 13:48:10 on ttys000
[                      1$ telnet 4          ) 80                    ]
Trying 4          )5...
Connected to (        )5.
Escape character is '^]'.
^ZConnection closed by foreign host.
```

Note

Configuring a security group has certain risks. Consider the following:

· Make sure that all domain names hosted in your origin server (ECS or SLB instance) are deployed with Alibaba Cloud WAF.

· In case of an Alibaba Cloud WAF cluster failure, where the WAF-inspected traffic is returned to origin server through a standby route, the access to your site will be affected if the security group policy is enabled in origin server.

· In case of an expansion of the Alibaba Cloud WAF IP addresses, 5xx error pages may be frequently returned to a visitor if the security group policy is enabled in origin server.

Procedure

1. Log on to the *Alibaba Cloud WAF console*.

2. Go to the Management > Website Configuration page.

3. Click Alibaba Cloud WAF IP range to view the WAF IP addresses.
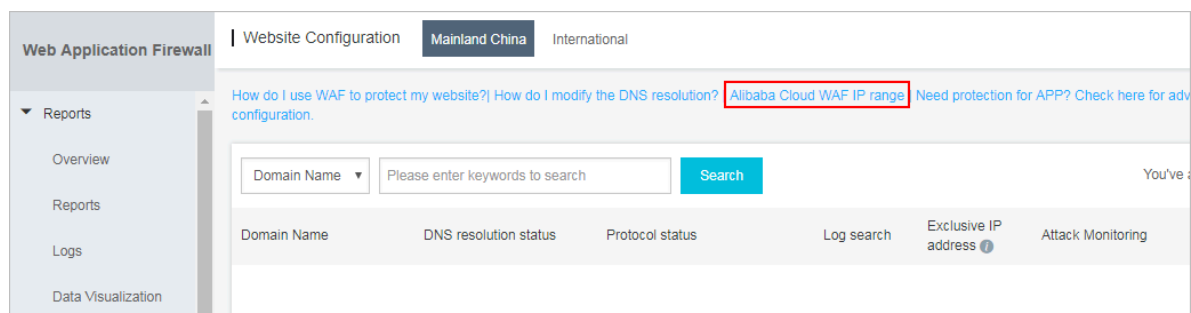
4. In the Alibaba Cloud WAF IP range dialog box, click Copy IP list.

5. **Configure the access control in your origin server to only allow the WAF IP addresses.**

   · **For an ECS origin**

      a. Go to the *ECS instance list*, locate the origin instance, and click Manage.

      b. In the left-side navigation pane, click Security Groups.

      c. Locate to the security group to be operated and click Add Rules.

      d. Click Add Security Group Rule and complete the following configuration to allow the WAF IP addresses with the highest priority.

         - NIC: Internet Network

         - Rule Direction: Ingress

         - Action: Allow

         - Protocol Type: Customized TCP

         - Authorization Type: Ipv4 CIRD Block

         - Port Range: 80/443

         - Authorization Objects: Paste the copied WAF IP addresses in step 4.

         - Priority: 1

      e. Add another security group rule and configure it as follows to block all accesses with the lowest priority.

         - NIC: Internet Network

         - Rule Direction: Ingress

         - Action: Forbid

         - Protocol Type: Customized TCP

         - Port Range: 80/443

         - Authorization Type: Ipv4 CIRD Block

         - Authorization Object: 0.0.0.0/0

         - Priority: 100

         Note:

If the origin instance interacts with other IPs or applications, you must add corresponding rules to allow accesses from them.

· **For an SLB origin**

The configuration in an SLB instance is similar as ECS. You add the WAF IP addresses to the whitelist. For more information, see *Configure access control*.

- Create an access control list
- Add the WAF IP addresses to the IP whitelist
- Enable the IP whitelist

3 Get real client IP address

In many cases, a visitor's browser is not directly connected to the server for website access because CDN, WAF, or Anti-DDoS Pro is deployed in between. For example, the following is a common architecture: Client > CDN/WAF/Anti-DDoS Pro > Origin server. Here, how can a server get the real IP address of the client whose initial request passes through multiple layers of acceleration?

When forwarding a user's request to the server next in the chain, a proxy server that is open and transparent adds an X-Forwarded-For record to the HTTP header. This record is used to record the user's real IP address and takes the format of `X -Forwarded-For: user IP`. If multiple proxy servers are involved in the request process, X-Forwarded-For record displays in the following format: `X-Forwarded-For : user's IP address, Proxy 1-IP address, Proxy 2-IP address, Proxy 3-IP address....`

Therefore, a common application server can use the X-Forwarded-For record to get a visitor's real IP address. The following content describes the corresponding X-Forwarded-For configuration methods for the Nginx, IIS 6, IIS 7, Apache, and Tomcat servers.

> (!) **Notice:**
>
> Back up your current environment such as the ECS snapshot and web server configuration file before performing the following configuration.

Nginx

1. Install http_realip_module.

As load balancing, Nginx uses http_realip_module to get the real IP address.

You can run the `# nginx -V | grep http_realip_module` command to verify whether or not, this module is installed. If not, recompile Nginx and load this module.

> 📋 **Note:**
>
> Nginx installed by the default procedure does not have this module installed.

Use the following code to install the http_realip_module module.

```
wget http://nginx.org/download/nginx-1.12.2.tar.gz
```

```
tar zxvf nginx-1.12.2.tar.gz
cd nginx-1.12.2
./configure --user=www --group=www --prefix=/alidata/server/nginx --
with-http_stub_status_module --without-http-cache --with-http_ssl_m
odule --with-http_realip_module
make
make install
kill -USR2 `cat /alidata/server/nginx/logs/nginx.pid`
kill -QUIT `cat /alidata/server/nginx/logs/ nginx.pid.oldbin`
```

2. Add the WAF IP addresses to the Nginx configuration.

Open `default.conf` and add the following content to `location / {}`:

```
set_real_ip_from ip_range1;
set_real_ip_from ip_range2;
...
set_real_ip_from ip_rangex;
real_ip_header    X-Forwarded-For;
```

📋 **Note:**

`ip_range1,2,...,x` indicates the back-to-source IP addresses of WAF, and multiple
entries must be added respectively.

3. Modify log_format.

`log_format` usually exists under the HTTP configuration in `nginx.conf`. Add the `x-forwarded-for` field in `log_format` to replace the original `remote-address`. After the modification, `log_format` is as follows.

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

After the preceding operations are completed, run `nginx -s reload` to restart Nginx and validate the configuration. When the configuration is effective, the Nignx server records the client IP address in the X-Forwarded-For field.

IIS 6

You can get the visitor's real IP address from the IIS 6 log, provided that the *F5XForwardedFor.dll* plug-in has been installed.

1. Copy *F5XForwardedFor.dll* from the *x86\Release* or *x64\Release* directory (according to the OS version of the server) to a specified directory assumed as *C:\ ISAPIFilters*, and make sure that the IIS process has the read permission for this directory.

2. Open the IIS manager, find the currently visited website, right-click the website and select Property to open the Property page.

3. Switch to the ISAPI Filter tab page on the Property page and click Add.

4. Set the following parameters in the Add window, and then click OK.

   · Filter name: F5XForwardedFor

   · Executable file: enter the complete path of F5XForwardedFor.dll. In this example, `C:\ISAPIFilters\F5XForwardedFor.dll`.

5. Restart the IIS server and wait for the configuration to be effective.

IIS 7

You can get the visitor's real IP address through the *F5XForwardedFor* module.

1. Copy `F5XFFHttpModule.dll` and `F5XFFHttpModule.ini` from the `x86\Release` or `x64\Release` directory (according to the OS version of the server) to a specified directory assumed as `C:\x_forwarded_for\x86` and `C:\x_forwarded_for\x64`, and make sure that the IIS process has the read permission for this directory.

2. In IIS Manager, double-click to open Module.

3. Click Configure Local Module.

4. Click Register in the Configure Local Module dialog box, and register the downloaded DLL file.

   · Register the x_forwarded_for_x86 module

     - Name: x_forwarded_for_x86

     - Path: `C:\x_forwarded_for\x86\F5XFFHttpModule.dll`

   · Register the x_forwarded_for_x64 module

     - Name: x_forwarded_for_x64

     - Path: `C:\x_forwarded_for\x64\F5XFFHttpModule.dll`

5. After registration, select the newly registered modules (x_forwarded_for_x86 and x_forwarded_for_x64), and click OK to enable them.

6. Add the registered DLL in API and CGI restrictions respectively, and change the settings from Restricted to Allowed.

7. Restart the IIS server and wait for the configuration to be effective.

Apache

Follow these steps to obtain the visitor's real IP address in Apache.

1. **Run the following code to install the third-party module** *mod_rpaf* **for Apache.**

```
wget http://stderr.net/apache/rpaf/download/mod_rpaf-0.6.tar.gz
tar zxvf mod_rpaf-0.6.tar.gz
cd mod_rpaf-0.6
/alidata/server/httpd/bin/apxs -i -c -n mod_rpaf-2.0.so mod_rpaf-2.0
.c
```

2. **Modify the Apache configuration file** `/alidata/server/httpd/conf/httpd.conf` **and add the following information at the end.**

```
LoadModule rpaf_module modules/mod_rpaf-2.0.so
RPAFenable On
RPAFsethostname On
RPAFproxy_ips IP address
RPAFheader X-Forwarded-For
```

Where `RPAFproxy_ips ip address` is not the public IP address provided by Server Load Balancer. You can obtain the specific IP address from the Apache log. Usually two IP addresses are included.

3. **Run the following command to restart Apache once you add the IP address.**

```
/alidata/server/httpd/bin/apachectl restart
```

Tomcat

You can enable the X-Forwarded-For feature of the Tomcat server as follows.

Open *tomcat/conf/server.xml* and modify the AccessLogValve log record function to the following content:

```
<Valve className="org.apache.catalina.valves.AccessLogValve" directory
="logs"
prefix="localhost_access_log." suffix=".txt"
pattern="%{X-FORWARDED-FOR}i %l %u %t %r %s %b %D %q %{User-Agent}i %T
" resolveHosts="false"/>
```

4 Integrate Alibaba Cloud WAF log with syslog

This topic describes how to integrate Alibaba Cloud WAF log with syslog to guarantee all compliance, auditing, and other related logs can be ingested into your Security Operation Center.

Overview

The following figure illustrates the syslog integration architecture:
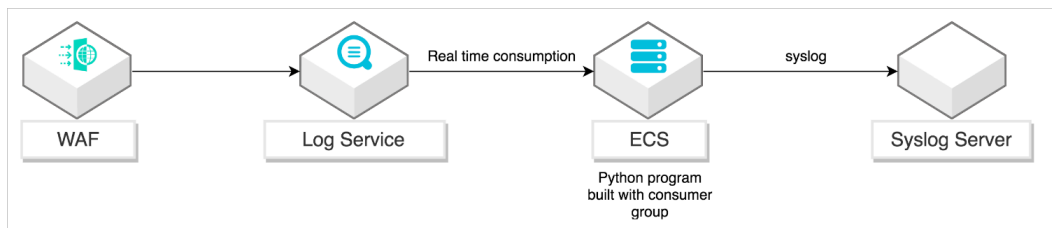
Alibaba Cloud Log Service is a one-stop service for log data. Log Service experiences massive big data scenarios of Alibaba Group. Log Service (LOG or SLS) allows you to quickly complete the collection, consumption, shipping, query, and analysis of log data without the need for development, which improves the Operation & Maintenance (O&M) efficiency and the operational efficiency, and builds the processing capabilities to handle massive logs in the DT (data technology) era. For more information, see *Log Service Production Introduction*.

Python Program is a program running on ECS to deliver WAF log to a syslog server. The consumer library is an advanced mode of log consumption in Log Service, and provides the consumer group concept to abstract and manage the consumption end. Compared with using SDKs directly to read data, you can only focus on the business logic by using the consumer library, without caring about the implementation details of Log Service, or the load balancing or failover between consumers. For more information, see *Consumer group introduction*.

Syslog Server is a centralize log message management server to receive multiple syslog sources.

Prerequisites

Before you begin, make sure of the following:

·   You have purchased Alibaba Cloud WAF business edition or above to protect your website. For more information, see *Purchase Alibaba Cloud WAF* and *Implement Alibaba Cloud WAF*.

·   You have a Linux ECS server with the following recommended hardware spec:

   -   Operating System with Ubuntu

   -   8 vCPUs with 2.0+ GHz

   -   32GB Memory

   -   at least 2GB available disk space (10GB or more is suggested)

·   You have a syslog server with UDP port 514 enabled to receive syslog.

Procedure

1. **Enable Alibaba Cloud WAF logging.**

   Follow these steps to enable Alibaba Cloud WAF logging in the WAF console:

   a. Log on to the *Alibaba Cloud WAF console*.

   b. In the left-side navigation pane, selectApp Market > App Management.

   c. Under Real-time Log Query and Analysis Service, click Upgrade.
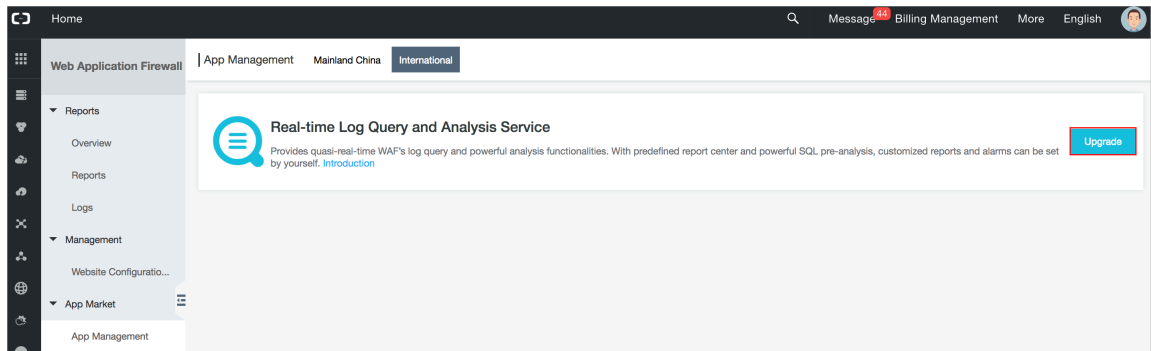
   d. On the Update page, enable Access Log Service and select Log Storage Period and Log storage Size accordingly.
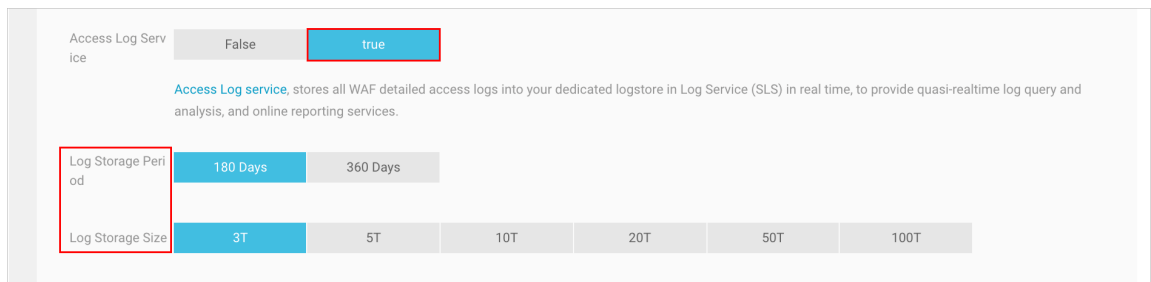
   e. After activating Log service, click Authorization under Real-time Log Query and Analysis Service.
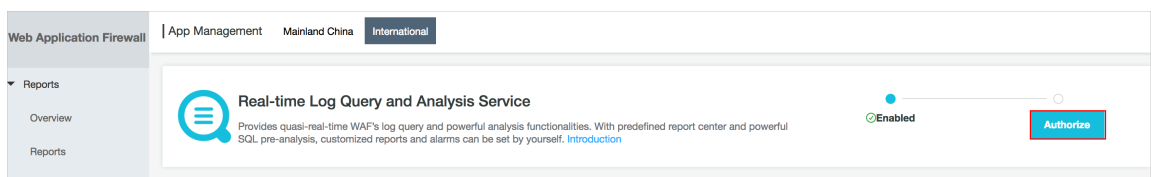
   f. On the Cloud Resource Access Authorization page, click Confirm Authorization Policy.
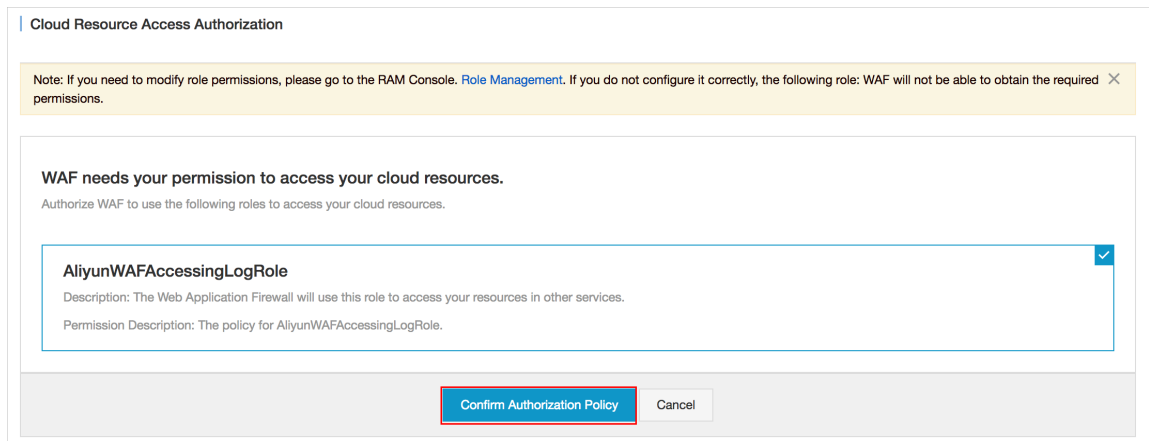
g. Under Real-time Log Query and Analysis Service, click Configure.
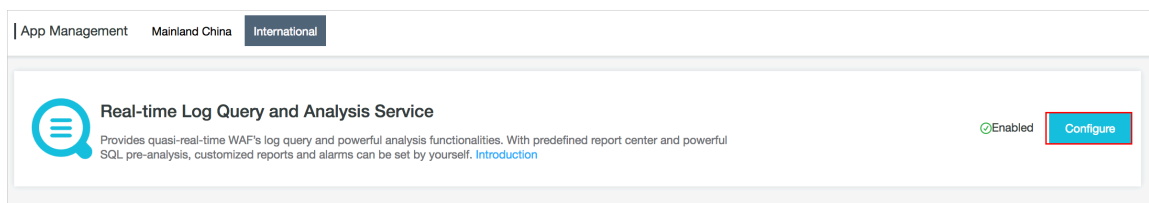
h. In the domain name drop-down box, enable the website you want to enable Log service.
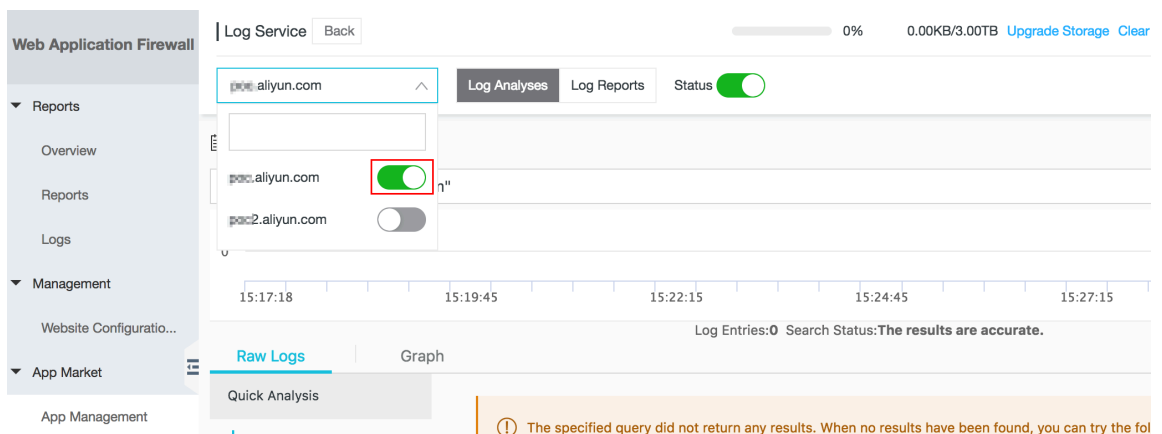
2. Set up the Python environment in ECS.

Follow these steps to install the Log Service Python SDK in ECS:

a. Log on to the ECS instance through SSH or the console. For more information, see *Connect to an ECS instance*.

b. Install Python3, pip and Python SDK of Log Service. For more information on Log Service Python SDK, see *User Guide*.

```
apt-get update
apt-get install -y python3-pip python3-dev
cd /usr/local/bin
ln -s /usr/bin/python3 python
pip3 install --upgrade pip
```

```
pip install aliyun-log-python-sdk
```
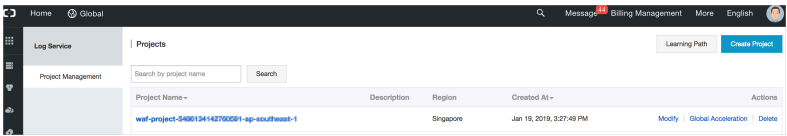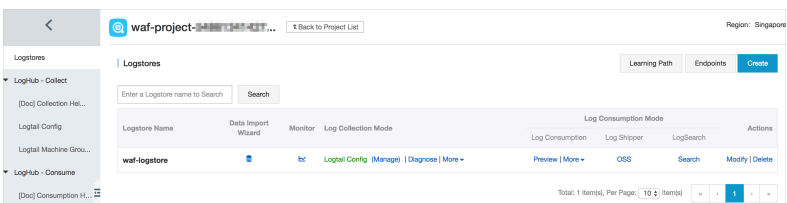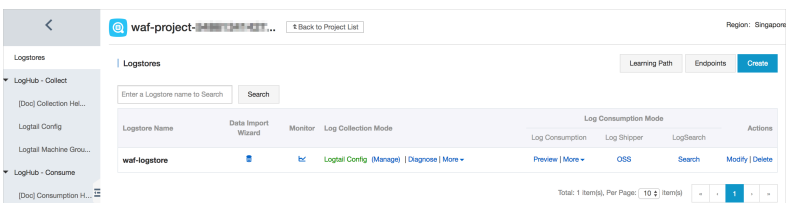
3. **Configure Python program to send logs to the syslog server.**
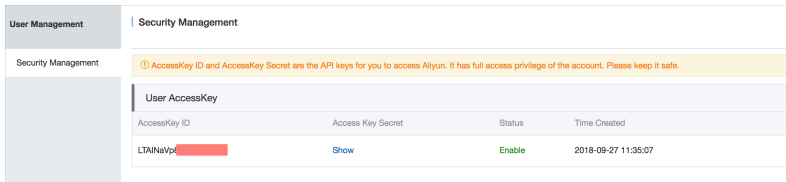
   Follow these steps to configure Python Program to ship WAF logs to the syslog
   server:

   a. Download the latest example of integration code from *GitHub*:

   ```
   wget https://raw.githubusercontent.com/aliyun/aliyun-log-python-
   sdk/master/tests/consumer_group_examples/sync_data_to_syslog.py
   ```

   b. Replace Log Service and syslog related settings in Python Program, including:

Parameter	Meaning	Description
SLS Project	Log Service project name	Project is Log Service's resource management unit, used to isolate and control resources. You can find the Project Name in the *Alibaba Cloud Log Service console*.
SLS Endpoint	Log Service Endpoint	Log Service Endpoint is a URL used to access a project and logs within the project, and is associated with the Alibaba Cloud region where the project resides and the project name. You can find the Endpoint URL in *Service endpoint*.
SLS Logstore	Logstore	Logstore is a unit in Log Service for the collection, storage, and query of log data. Each Logstore belongs to a project, and each project can create multiple Logstores. You can find the Logstore Name under your Log Service Project in the *Alibaba Cloud Log Service console*:

Parameter	Meaning	Description
SLS accessKeyId and accessKey	AccessKey	AccessKey is a "secure password" designed for you to access your cloud resources by using APIs (not the console). You can use the AccessKey to sign API request content to pass the security authentication in Log Service. For more information, see *AccessKey Introduction*. You can find your Accesskey in the *User Management console*: User Management / Security Management Security Management ⓘ AccessKey ID and AccessKey Secret are the API keys for you to access Aliyun. It has full access privilege of the account. Please keep it safe. User AccessKey AccessKey ID / Access Key Secret / Status / Time Created LTAINaVpt / Show / Enable / 2018-09-27 11:35:07
Syslog Host	Syslog Host	Syslog host is same as the IP address/Hostname you access syslog server.
Syslog Port	Syslog Port	Syslog port is a port to receive syslog. UDP uses port 514 and TCP uses port 1468.
Syslog protocol	Syslog protocol	You can specify UDP or TCP to receive syslog, depending on your syslog server setting.
Syslog separator	Syslog separator	Syslog separator is used to separate syslog key-value pairs.

The following is the sample setting in Python Program:

- **Log Services**

```
endpoint = os.environ.get('SLS_ENDPOINT', 'http://ap-southeast-
1.log.aliyuncs.com')
accessKeyId = os.environ.get('SLS_AK_ID', 'replace to your
accessid')
accessKey = os.environ.get('SLS_AK_KEY', 'replace to your
accesskey')
project = os.environ.get('SLS_PROJECT', 'waf-project-5486134142
760591-ap-southeast-1')
logstore = os.environ.get('SLS_LOGSTORE', 'waf-logstore')
consumer_group = os.environ.get('SLS_CG', 'WAF-SLS')
```

- **Syslog**

```
settings = {
            "host": "1.2.3.4",
            "port": 514,
            "protocol": "udp",
            "sep": ",",
            "cert_path": None,
            "timeout": 120,
            "facility": syslogclient.FAC_USER,
            "severity": syslogclient.SEV_INFO,
            "hostname": None,
```

```
            "tag": None
      }
```

c. Run Python Program. Suppose the Python program is saved as "sync_data_to_syslog.py". You can launch it as:

```
python sync_data_to_syslog.py
```

The Python program log shows successfully sent log to remote syslog server.

```
*** start to consume data...
consumer worker "WAF-SLS-1" start
heart beat start
heart beat result: [] get: [0, 1]
Get data from shard 0, log count: 6
Complete send data to remote
Get data from shard 0, log count: 2
Complete send data to remote
heart beat result: [0, 1] get: [0, 1]
```

You are able to search the WAF log in syslog server now.