Domain Name Service

Best Practices

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1 Setting CAA Records to Prevent Unauthorized HTTPS Certificate Issuing

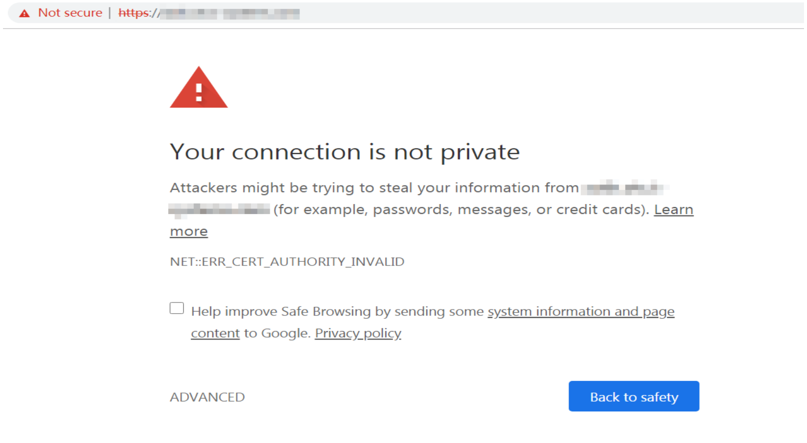
Certification Authority Authorization (CAA) is a way to ensure that HTTPS certificates are issued by authorized certificate authorities (CAs). It is in compliance with IETF RFC 6844 standards. Since September 8, 2017, all CAs must check CAA records before issuing a certificate.

Using Huawei Cloud DNS, you can add CAA records for your public domain names on the web-based management console.

Background

There are hundreds of CAs in the world that can issue HTTPS certificates for websites. If a CA is blacklisted, the browser will no longer trust the HTTPS certificates issued by this CA. If users try to access websites that have those certificates, the browser will prompt that the websites are not secure.

Figure 1-1 Untrusted HTTPS certificate warning



Not secure | ~~https~~://[redacted]

Your connection is not private

Attackers might be trying to steal your information from [redacted] (for example, passwords, messages, or credit cards). Learn more

NET::ERR_CERT_AUTHORITY_INVALID

□ Help improve Safe Browsing by sending some system information and page content to Google. Privacy policy

According to the CAA standards, a compliant CA must check CAA records of a domain name before issuing certificates.

- If the CA does not find any CAA records, it can issue a certificate for the domain name.

Any other CAs are also able to issue certificates for this domain name, bringing risks of certificate mis-issuing.

- If the CA finds a CAA record that authorizes it to issue certificates, it will issue a certificate for the domain name.
- If the CA finds a CAA record, but the record does not authorize it to issue certificates, the CA will not be able to issue HTTPS certificates for the domain name. In this case, HTTPS certificates will not be mis-issued.

Adding CAA records for website domain names enables you to configure a CA whitelist. Only authorized CAs can issue certificates for your website.

Configuration Rule

A CAA record consists of a flag byte and a tag-value pair in the format of **[flag] [tag] [value]**.

The elements in a CAA record are described as follows:

- **flag**: CA identifier, which is an unsigned character ranging from 0 to 255. Usually, it is specified to **0**.
- **tag**: Enter 1 to 15 characters, including letters and digits from 0 to 9. The tag can be the following:
  - **issue**: authorizes CAs to issue all types of certificates.
  - **issuewild**: authorizes CAs to issue wildcard certificates.
  - **iodef**: requests notifications once CAs receive invalid certificate requests.
- **value**: authorized CA or email address/URL for notifications once the CA receives invalid certificate requests, depending on the setting of the tag. The value must be enclosed in quotation marks (""). The value can be up to 255 characters, including letters, digits, spaces, and special characters -#*?&_~=:;.@+^/!%

You can set CAA records based on the following rules in different scenarios.

Table 1-1 Configuration of CAA records

Function	Example	Description
Configure a CAA record for one domain name.	0 issue "ca.example.com"	Only the specified CA (**ca.example.com**) can issue certificates for a particular domain name (**domain.com**). Requests to issue certificates for the domain name by other CAs will be rejected.
	0 issue ";"	No CA is allowed to issue certificates for the domain name **domain.com**.
Configure the CA to report violations to the domain name holder.	0 iodef "mailto:admin@domain.com"	If a certificate request violates the CAA record, the CA will notify the domain name holder of the violation.

Function	Example	Description
	0 iodef "http://domain.com/log/" 0 iodef "https://domain.com/log/"	Requests to issue certificates by unauthorized CAs will be recorded.
Authorize a CA to issue wildcard certificates.	0 issuewild "ca.example.com"	The specified CA (**ca.example.com**) can issue wildcard certificates for the domain name.
Configuration example	0 issue "ca.abc.com" 0 issuewild "ca.def.com" 0 iodef "mailto:admin@domain.com"	The example configures a CAA record for the domain name **domain.com**. ● Only CA **ca.abc.com** can issue certificates of all types. ● Only CA **ca.def.com** can issue wildcard certificates. ● Any other CAs are not allowed to issue certificates. ● When a violation occurs, the CA sends a notification to **admin@domain.com**.

Adding a CAA Record Set

1. Log in to the management console.
2. In the **Network** category, click **Domain Name Service**.

   The DNS console is displayed.
3. In the navigation pane, choose .

   The **Public Zones** page is displayed.
4. In the public zone list, click the zone name **domain.com**.

   The record set page is displayed.
5. Click **Add Record Set**.

   The **Add Record Set** dialog box is displayed.
6. Set CAA record set parameters.
   - **Type**: **CAA – Grant certificate issuing permissions to CAs**
   - **Line**: **Default**
   - **TTL**: **300s** (5 minutes)
   - **Value**:

     0 issue "ca.abc.com"

     0 iodef "mailto:admin@domain.com"
7. Click **OK**.

Checking Whether a CAA Record Has Taken Effect

Use Domain Information Groper (dig) to check whether the CAA record has taken effect. dig is a network administration command-line tool for querying the Domain Name System. If your OS does not support dig commands, install the dig tool.

Command format: **dig** [*Record set type*] [*Domain name*] **+trace**.

Example command:

```
dig caa www.example.com +trace
```

2 Configuring a Private Domain Name for an ECS

Background

Private domain names do not need to be registered, and they take effect only within VPCs and are resolved by private DNS servers. With private domain names, you can have your own authoritative DNS servers in VPCs and avoid exposing your DNS records to the Internet. Private domain names improve resolution efficiencies, reduce latencies, and prevent DNS spoofing.

By configuring private zones for ECSs in VPCs, you can:

- Access ECSs in the VPCs through private domain names without going through the Internet, achieving higher efficiency and security.
- Write domain names, instead of IP addresses in the code. When an ECS is changed, you only need to change the DNS records without modifying the code.

Application Scenario

Figure 2-1 shows a typical application scenario of private domain names.

Figure 2-1 Networking example

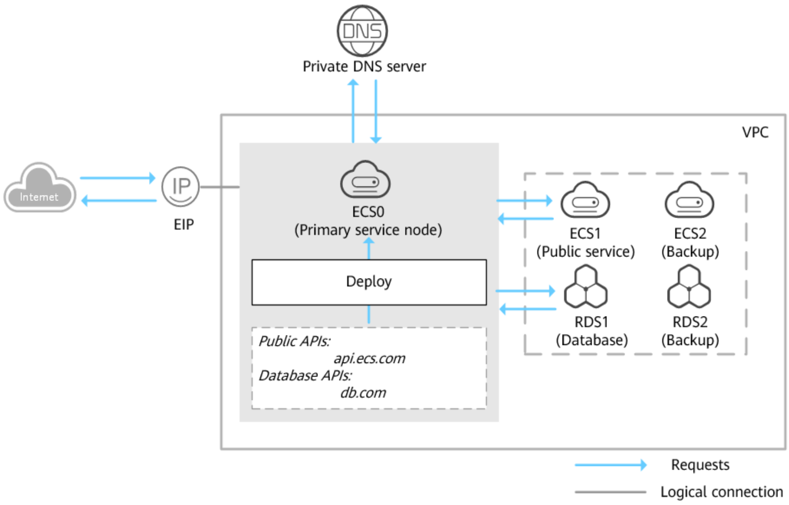


Figure 2-1 shows the networking of a website, where ECSs and RDS instances are deployed in a VPC.

- ECS0: primary service node
- ECS1: public service node
- RDS1: service database
- ECS2 and RDS2: backup node and backup database

When ECS1 becomes faulty, ECS2 must take over. However, if no private zones are configured for the two ECSs, change the private IP addresses in the code for ECS0. This will interrupt services, and you will need to publish the website again.

Now assume that you have configured private zones for the ECSs and have included their host names in the code. If ECS1 becomes faulty, you only need to change the DNS records to direct traffic to ECS2. Services are not interrupted, and you do not need to publish the website again.

This practice describes how to configure private zone for cloud servers.

Data Planning

Table 2-1 lists the private zones and record sets planned for the cloud servers.

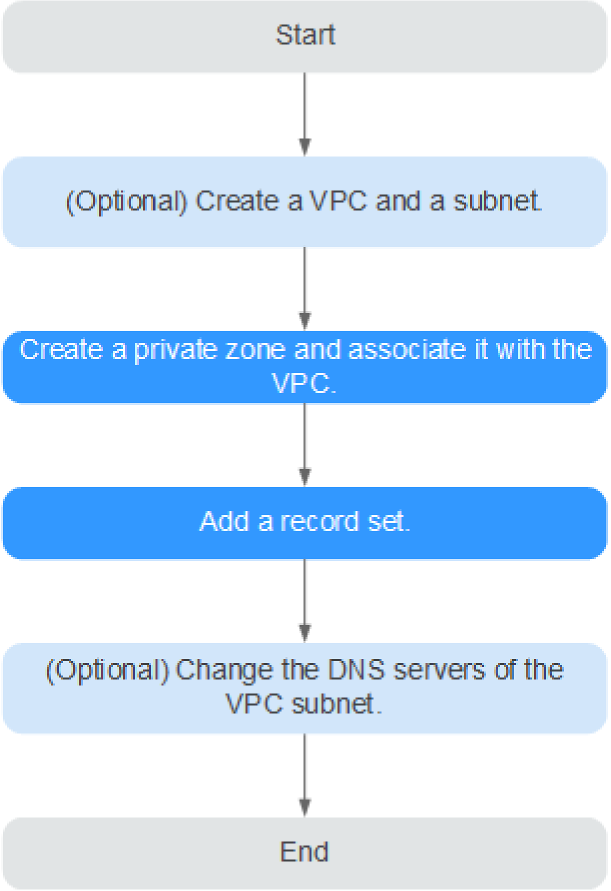
Table 2-1 Private zones and record sets for each server

Item	Private Zone	Associated VPC	Private IP Address	Record Set Type	Description
ECS1	api.ecs.com	VPC_001	192.168.2.8	A	Node that provides public services
ECS2	api.ecs.com	VPC_001	192.168.3.8	A	Backup for the public service node
RDS1	db.com	VPC_001	192.168.2.5	A	Service database
RDS2	db.com	VPC_001	192.168.3.5	A	Backup database

Operation Procedure

Figure 2-2 shows the process for configuring private zones.

Figure 2-2 Process for configuring private zones


Start
(Optional) Create a VPC and a subnet.
Create a private zone and associate it with the VPC.
Add a record set.
(Optional) Change the DNS servers of the VPC subnet.
End

Process description:

- Create a VPC and a subnet on the VPC console. This operation is required only when you are configuring private domain names for servers during initial website deployment.
- Create a private zone and associate it with the VPC and add a record set to the private zone on the DNS console.
- Change the DNS servers of the VPC subnet on the VPC console. This operation is required only when you are configuring private domain names for servers on which your website services are already running.

(Optional) Create a VPC and a Subnet

Before configuring private domain names for ECSs and database nodes during website deployment, you need to create a VPC and a subnet.

1. Log in to the management console.
2. In the **Network** category, click **Virtual Private Cloud**.
3. In the navigation pane on the left, choose **Virtual Private Cloud**.
4. Click **Create VPC** and set parameters based on **Table 2-2**.

Table 2-2 VPC parameter description

Parameter	Description	Example Value
Region	Region of the VPC. For low network latency and quick resource access, select the nearest region.	CN North-Beijing1
Name	VPC name	VPC_001
CIDR Block	Network range of the VPC. All VPC subnets must be within this range. Choose one from the following CIDR blocks: ● 10.0.0.0/8–24 ● 172.16.0.0/12–24 ● 192.168.0.0/16–24	192.168.0.0/16
Name (default subnet)	Subnet name	Subnet
CIDR Block (default subnet)	Network range of the subnet, which must be within the VPC	192.168.0.0/24
Gateway	Gateway address of the subnet	192.168.0.1
DNS Server Address	Set the DNS severs of the VPC subnet to those provided by Huawei Cloud DNS.	100.125.1.250 100.125.21.250

5. Click **Create Now**.

Create a Private Zone

Create private zones for the domain names of ECS1 and RDS1.

1. In the **Network** category, click **Domain Name Service**.

   The DNS console is displayed.
2. In the navigation pane, choose .
3. Click **Create Private Zone**.
4. Configure the parameters according to **Table 2-3**.

Table 2-3 Parameters required for creating a private zone

Parameter	Description	Example Value
Name	Private domain name. You can customize any correctly formatted domain names, even top-level ones.	api.ecs.com

Parameter	Description	Example Value
VPC	VPC to be associated with the private zone	VPC_001
Email	(Optional) Email address of the administrator managing the private zone. It is recommended that you set the email address to **HOSTMASTER@Domain name**. For more details about the email address, see	HOSTMASTER@ecs1.com
Description	(Optional) Description of a zone. The value cannot exceed 255 characters.	This is a private zone.

5. Click **OK**. A private zone **api.ecs.com** is created.

   You can query information about the private zone you created on the **Private Zones** page.

   NOTE

   Click the zone name to query detailed zone information. The system has created record sets of the SOA type and NS type in the zone.

   - The SOA record set determines the DNS server that is the authoritative information source for a particular domain name.
   - The NS record set defines authoritative DNS servers for a zone.

6. Repeat steps **3** to **5** to create a private zone **db.com**.

   For details about domain name planning, see **Table 2-1**.

Create a Record Set

Add the record sets to map private domain names to private IP addresses of ECS1 and RDS1.

1. In the zone list on the **Private Zones** page, click the name of the private zone you created.

   The record set page is displayed.

2. Click **Add Record Set**.
3. Configure the parameters according to **Table 2-4**.

Table 2-4 Parameters required for adding a record set of the A type

Parameter	Description	Example Value
Name	Domain name prefix If this parameter is left blank, the record set name is **api.ecs.com** by default.	-

Parameter	Description	Example Value
Type	Type of the record set	A – Map domains to IPv4 addresses
TTL (s)	Caching period of the record set on a DNS server If your service address is frequently changed, set TTL to a small value.	The default value is **300**, which is 5 minutes.
Value	IPv4 addresses mapped to the domain name. Every two IPv4 addresses are separated using a line break. Enter the private IP address of the ECS.	192.168.2.8
Description	(Optional) Description of the record set	-

4. Click **OK**. An A record set is added for **api.ecs.com**.
5. Repeat steps **1** to **4** to add an A record set for **db.com**.

   Set the record set value of **db.com** to **192.168.2.5**.

   For details, check **Table 2-1**.

(Optional) Change the DNS Servers of the VPC Subnet

After you configure private domain names for nodes in the website application, you need to change the DNS servers of the VPC subnet to those provided by the DNS service so that the domain names can be correctly resolved.

For details, see

Switch to the Backup ECS

When ECS1 becomes faulty, you can switch services to ECS2 by changing the record set value in private zone **api.ecs.com**.

1. Log in to the management console.
2. Click 📍 in the upper left and select .
3. In the **Network** category, click **Domain Name Service**.

   The DNS console is displayed.
4. In the navigation pane, choose .
5. In the private zone list, click the name of the zone **api.ecs.com**.
6. Locate the A record set and click **Modify** under **Operation**.
7. Change the value to **192.168.3.8**.
8. Click **OK**. The record set is modified.

Traffic to ECS1 will be seamlessly directed to ECS2 by the private DNS server.