HPE Alletra 9000 Storage Array

KeyControl® Integration Guide

2024-02-16

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Chapter 1. Introduction

This document describes the integration of the Hewlett Packard Enterprise (HPE) Alletra 9000 Storage Array (referred to as Alletra in this guide) with the Entrust KeyControl (formerly HyTrust KeyControl) key management solution using the open standard KMIP protocol. Entrust KeyControl (referred to as KeyControl in this guide) serves as a key manager for encryption keys by using various protocols, including KMIP.

1.1. Product configurations

Entrust has successfully tested the integration of KeyControl with HPE Alletra 9000 in the following configurations:

System	Version
Entrust KeyControl	10.2

1.2. Requirements

Before starting the integration process, familiarize yourself with:

- The documentation and set-up process for the HPE Alletra family of products in the HPE Alletra online documentation.
- The documentation and set-up process for Entrust KeyControl, see the Entrust KeyControl Online Documentation Set.

Entrust recommends that you allow only unprivileged connections unless you are performing administrative tasks.

Chapter 2. Deploy and configure Entrust KeyControl

The following steps summarize the deployment of the Entrust KeyControl:

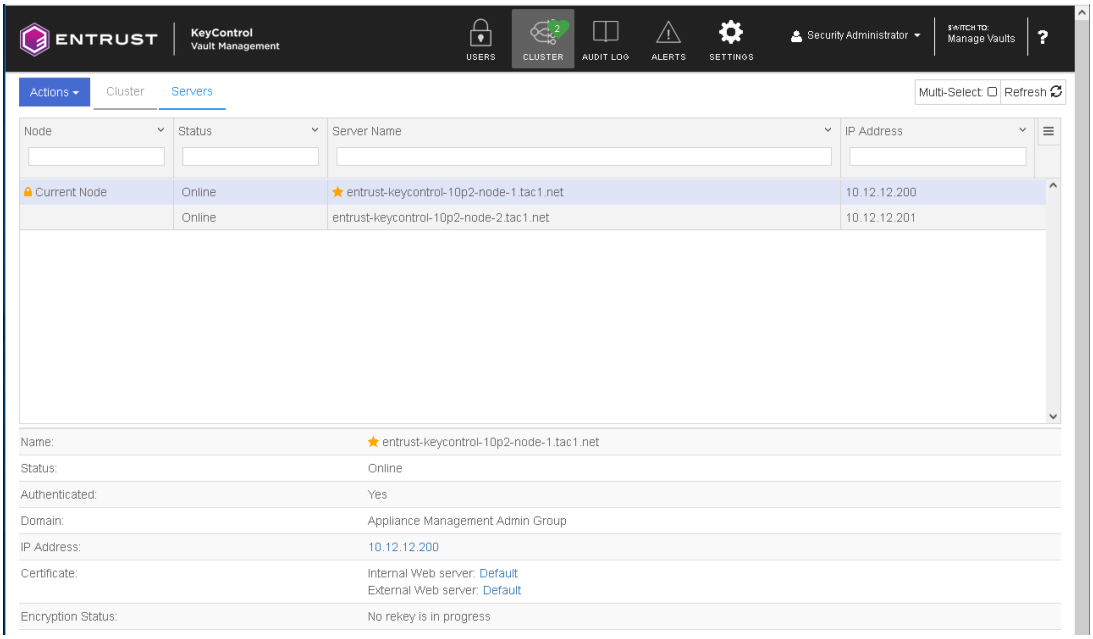
1. Deploy a Entrust KeyControl cluster
2. Additional Entrust KeyControl cluster configuration
3. Authentication
4. Create DNS record for Entrust KeyControl cluster
5. Create a KMIP Vault in the Entrust KeyControl
6. View the KMIP Vault details
7. Edit the KMIP Vault
8. Add KMIP Vault Administrators

2.1. Deploy a Entrust KeyControl cluster

This deployment consists of two nodes.

1. Download the Entrust KeyControl software from Entrust TrustedCare. This software is available both as an OVA or ISO image. The OVA installation method in VMware is used in this guide for simplicity.
2. Install Entrust KeyControl as described in Entrust KeyControl OVA Installation.
3. Configure the first Entrust KeyControl node as described in Configuring the First Entrust KeyControl Node (OVA Install).
4. Add second Entrust KeyControl node to cluster as described in Adding a New Entrust KeyControl Node to an Existing Cluster (OVA Install).

Both nodes need access to an NTP server, otherwise the above operation will fail. Log in the console to change the default NTP server if required.



5. Install the Entrust KeyControl license as described in Managing the Entrust KeyControl License.

2.2. Additional Entrust KeyControl cluster configuration

After the Entrust KeyControl cluster is deployed, additional system configuration can be done as described in Entrust KeyControl System Configuration.

2.3. Authentication

For simplicity, local account authentication is used in this integration. For AD-managed Security groups, configure the LDAP/AD Authentication Server as described in Specifying an LDAP/AD Authentication Server.

2.4. Create DNS record for Entrust KeyControl cluster

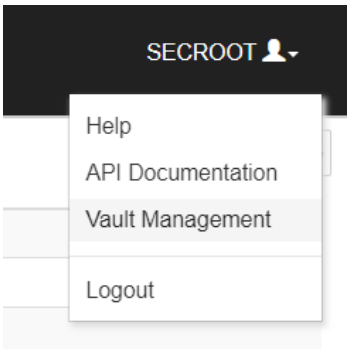
1. Create a single DNS record named **EntrustKeyControl** in the domain.
2. Assign this record as many IPs as nodes in the cluster created above, two in this integration.

2.5. Create a KMIP Vault in the Entrust KeyControl

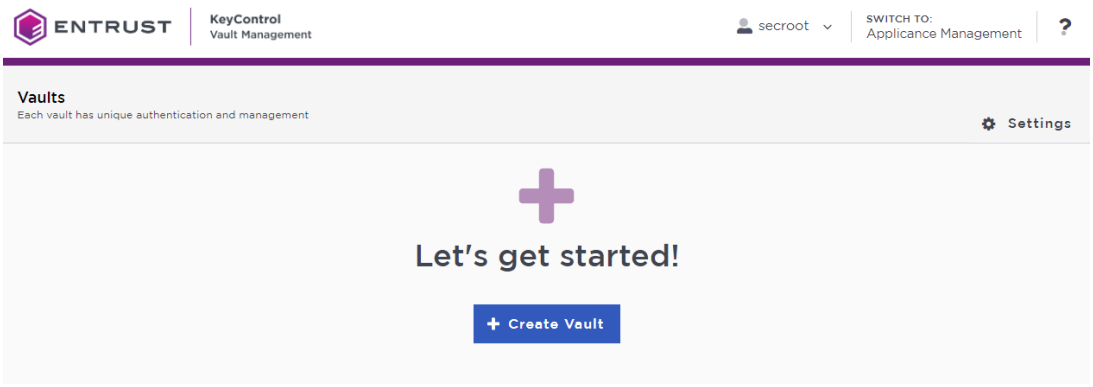
The Entrust KeyControl Vault appliance supports different type of vaults that can be used by all type of applications. This section describes how to create a KMIP Vault in the Entrust KeyControl Vault Server.

Refer to the Creating a Vault section of the admin guide for more details about it.

1. Sign in to the Entrust KeyControl Vault Server web user interface:
   a. Use your browser to access the IP address of the server.
   b. Sign in using the **secroot** credentials.
2. Select the user's dropdown menu and select **Vault Management**.



3. In the Entrust KeyControl Vault Management interface, select **Create Vault**.



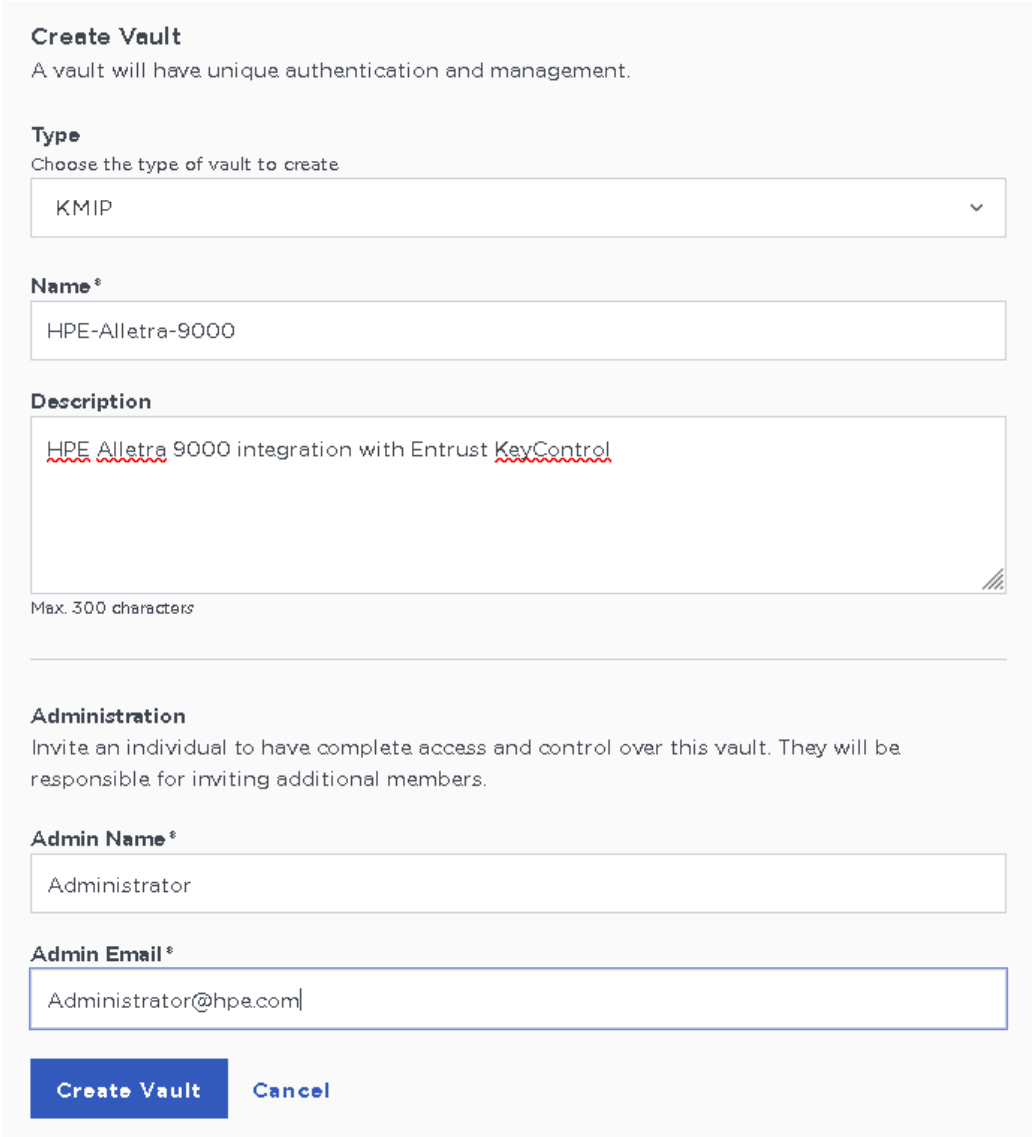
   Entrust KeyControl Vault supports the following types of vaults:

   - **Cloud Key Management** - Vault for cloud keys such as BYOK and HYOK.
   - **KMIP** - Vault for KMIP Objects.
   - **PASM** - Vault for objects such as passwords, files, SSH keys, and so on.
   - **Database** - Vault for database keys.
   - **Tokenization** - Vault for tokenization policies.
   - **VM Encryption** - Vault for encrypting VMs.

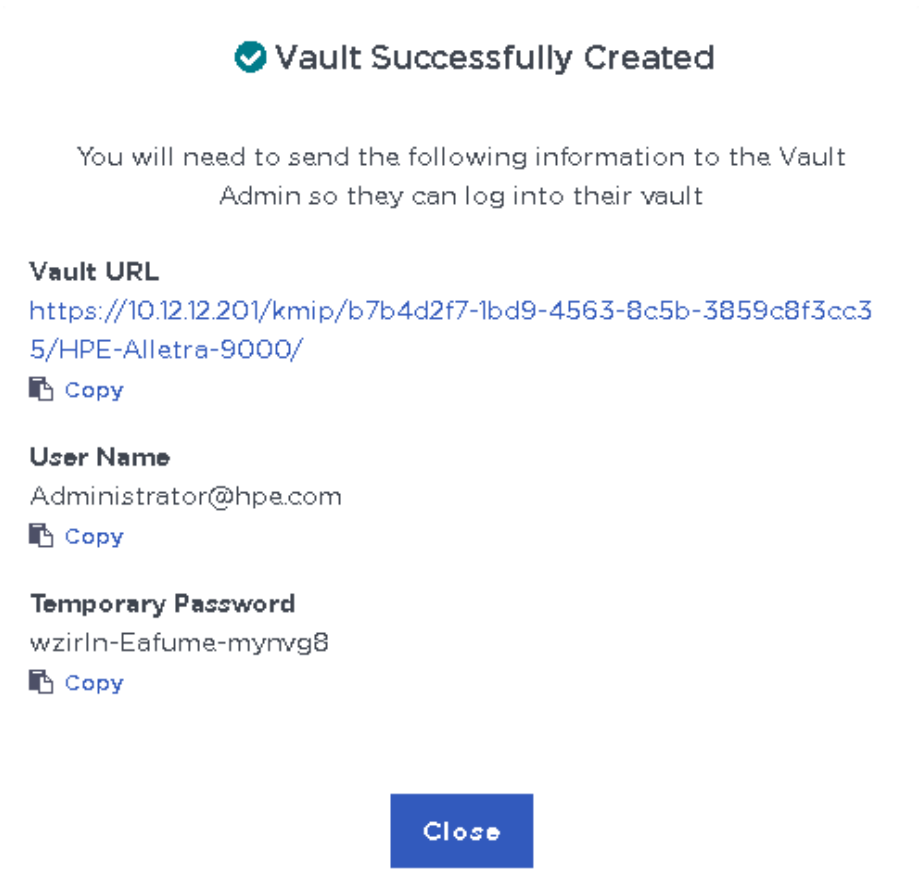
4. In the **Create Vault** page, create a **KMIP** Vault:

Field	Value
Type	**KMIP**
Name	Vault name
Description	Vault description
Admin Name	Vault administrator username
Admin Email	Vault administrator email

For example:

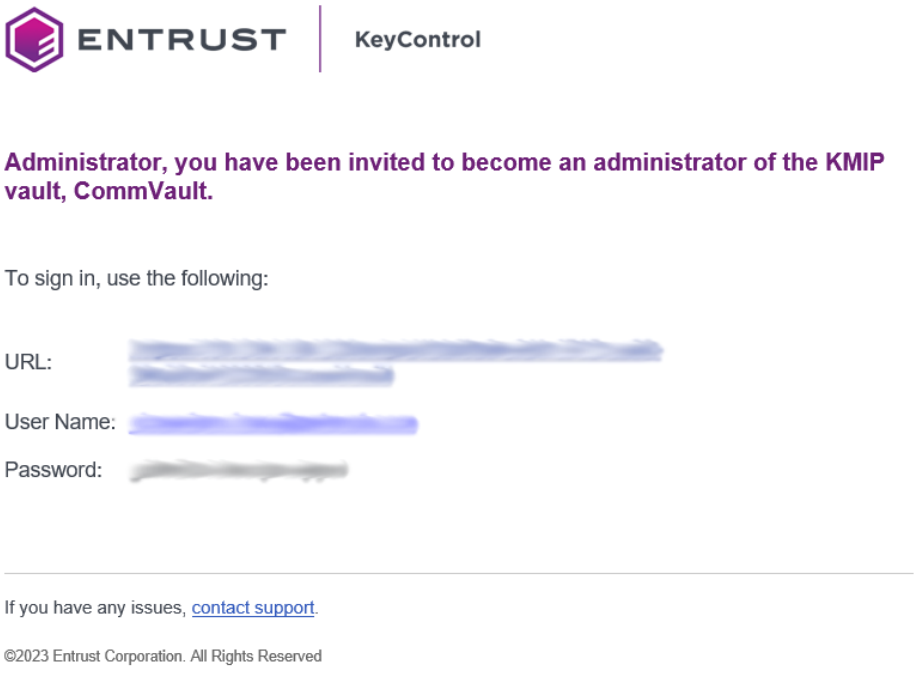


5. Select **Create Vault**. Then select **Close**.



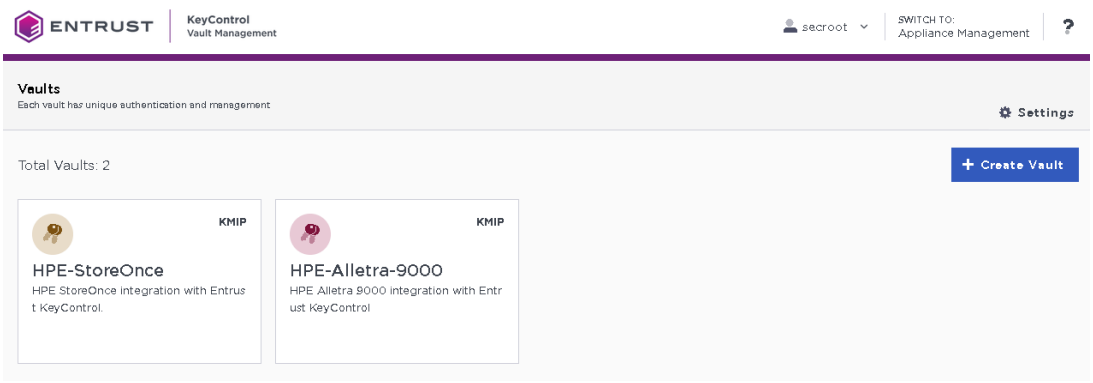
The newly created vault URL and login credentials will be emailed to the administrator's email address entered above. In closed gap environments where email is not available, the URL and login credentials are displayed at this time.

Example email:



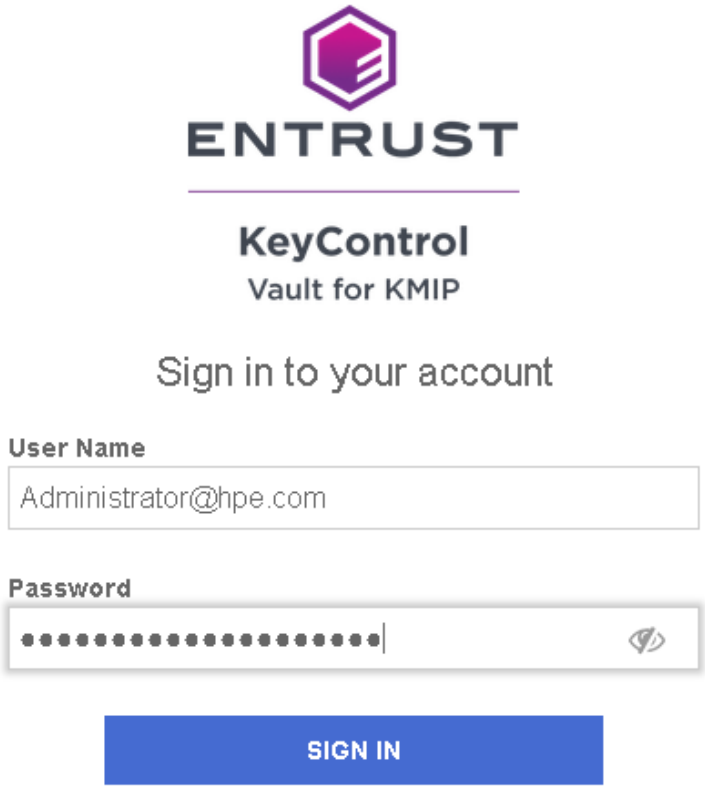
6. Bookmark the URL and save the credentials. Then select **Close** if the URL and login credentials are displayed.
7. The newly created Vault is added to the **Vault Management** dashboard.

   For example:



8. Sign in through the URL provided above with the temporary password. Change the initial password when prompted. Sign in again to verify.

   For example:



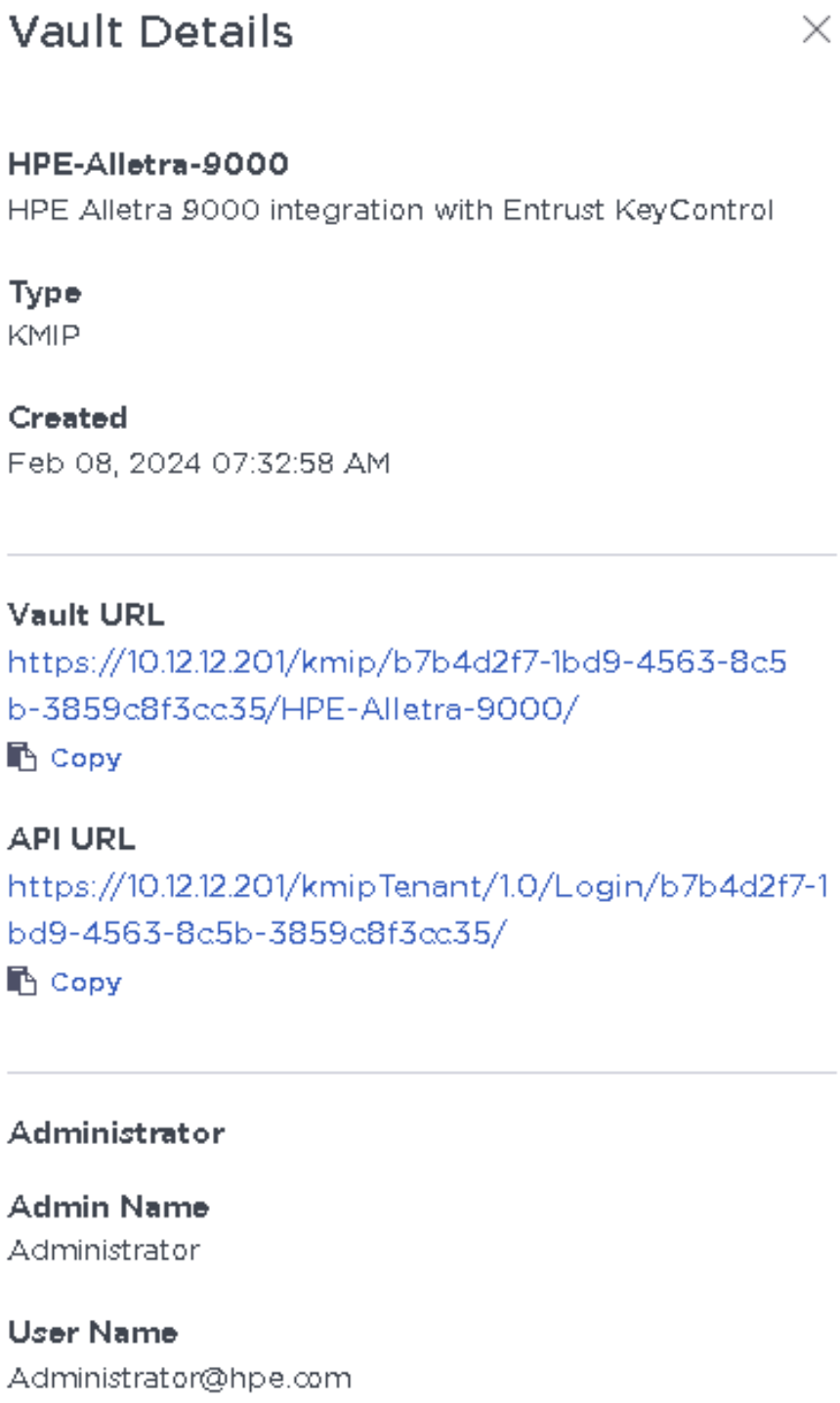
9. Notice the new vault.

   For example:

2.6. View the KMIP Vault details

1. Hover over the Vault and select **View Details**.

   For example:

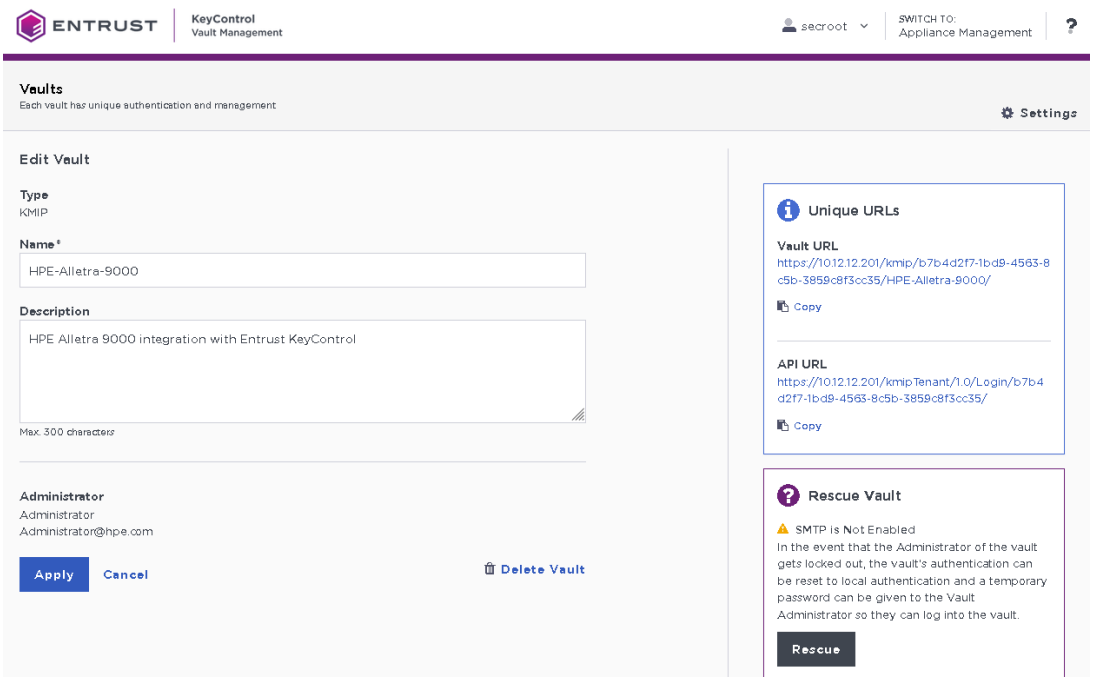


2. Select **Close** when done.

2.7. Edit the KMIP Vault

1. Select **Edit** when you hover over the Vault.

   For example:



2. Select **Apply** when done.

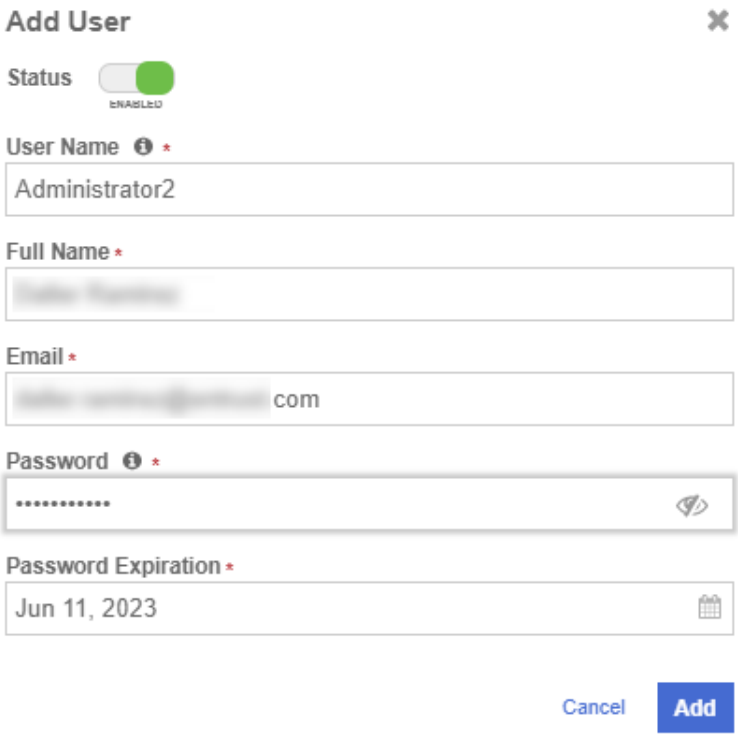
2.8. Add KMIP Vault Administrators

It is important to have other administrators set up on the Vault for recovery purposes. Add one or more admins to the Vault.

1. Select **Security > Users**.

2. In the **Manage Users** dashboard:
   a. Select the **+** icon to add one or more users.
   b. Add the user by providing the information requested in the **Add User** dialog.

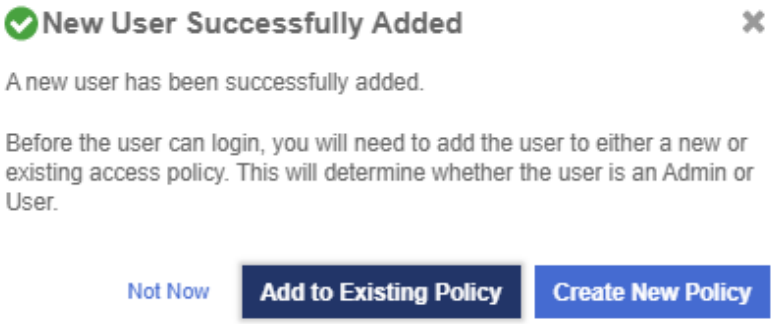
      For example:



c. Select **Add**.

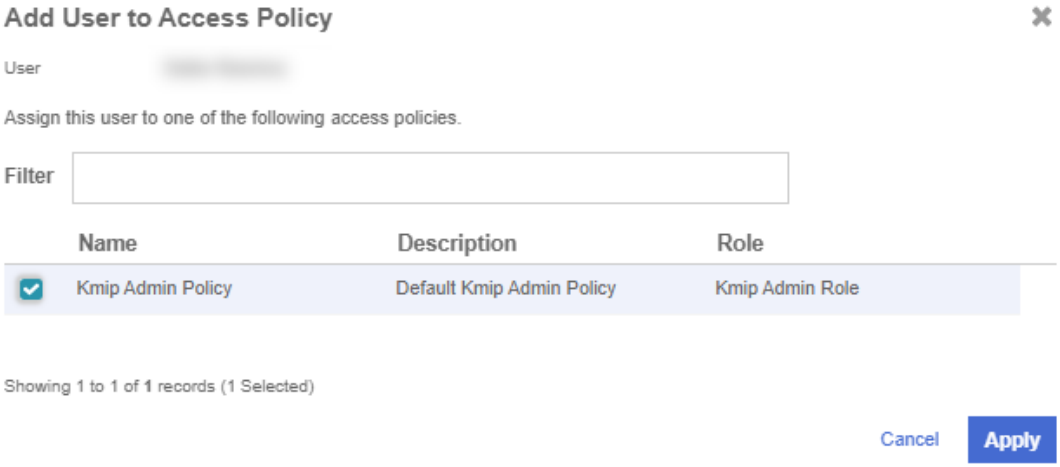
After the user is added, a window appears which requests selection of the policy to be used by this user.

3. Select **Add to Existing Policy**.



4. On the **Add User to Access Policy** dialog, select the **KMIP Admin Policy** and select **Apply**. The new user is added as an administrator to the Vault.

For example:


Add User to Access Policy
User
Assign this user to one of the following access policies.
Filter
Name
Description
Role
Kmip Admin Policy
Default Kmip Admin Policy
Kmip Admin Role
Showing 1 to 1 of 1 records (1 Selected)
Cancel
Apply

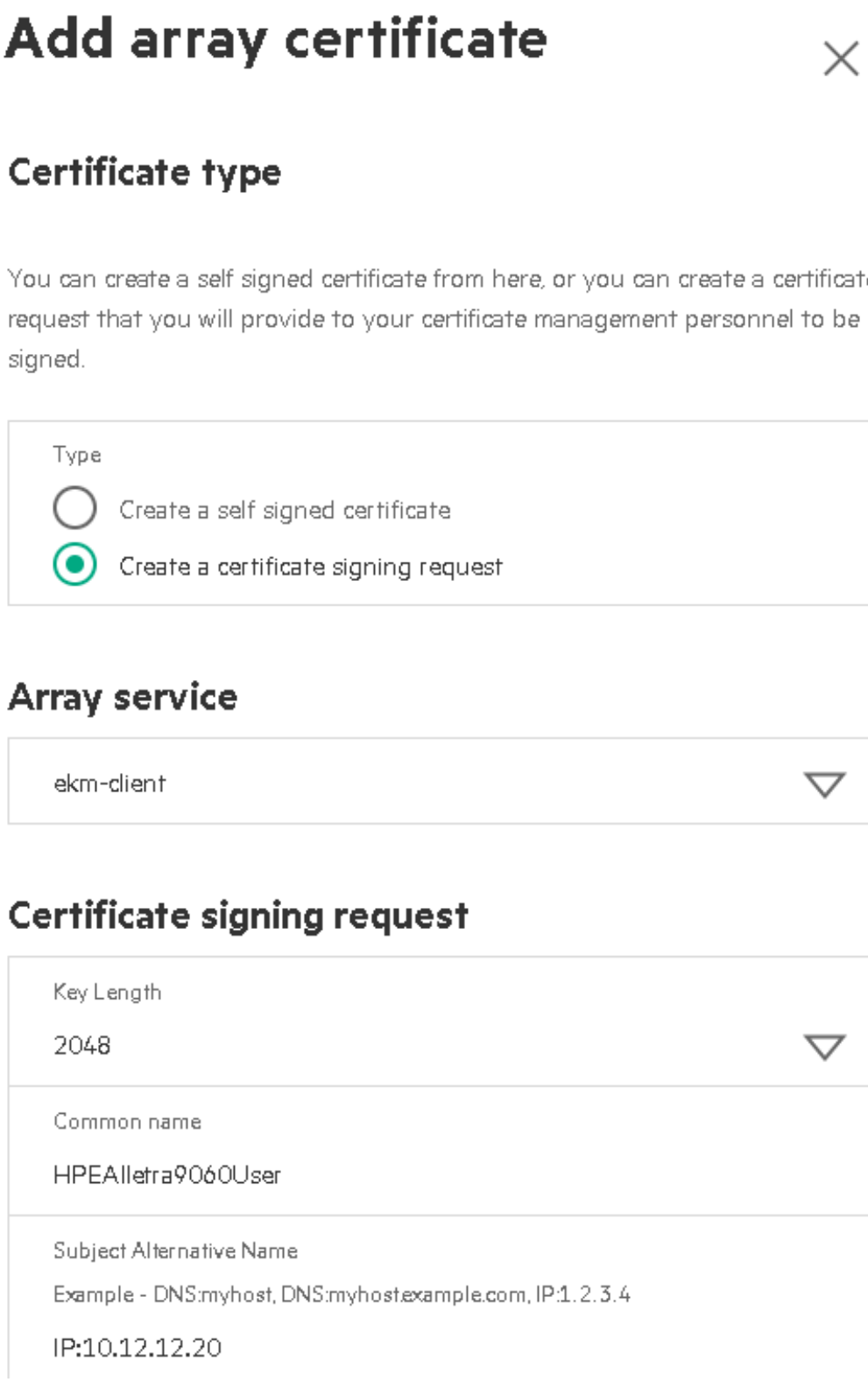
Chapter 3. Integrate Entrust KeyControl with HPE Alletra 9000

Follow these steps to register Entrust KeyControl as a KMS in HPE Alletra 9000.

1. Create the HPE Alletra certificate request
2. Create the client certificate bundle
3. Import client certificate into Alletra
4. Register the Entrust KeyControl KMS

3.1. Create the HPE Alletra certificate request

1. Sign in to the Alletra 9060 webGUI using an account with Security Admin privileges.
2. Select **Settings** in the toolbar. Then select **Array certificates**.
3. Select the **+** icon to add a certificate.
4. Select **Create a certificate signing request** for the **Certificate type**.
5. Select **ekm-client** for Array service and enter the **Common name** and other information. Then confirm the checkbox to proceed and select **Add**.

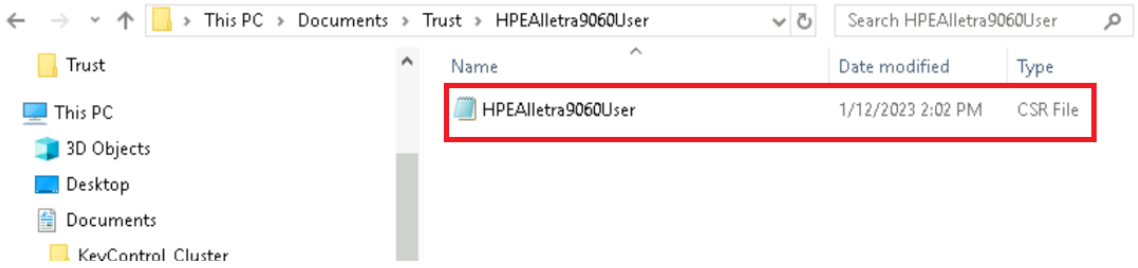


6. Select the certificate created.
7. Copy the **PEM** in the newly created certificate window.

General

Name	HPEAlletra9060User
Issuer	—
Start time	—
End time	—
Subject	C=US,ST=FL,L=Sunrise,O=Testing,OU=Integration,CN=HPEAlletra9060User
Subject Alternative Name	IP Address:10.12.12.20
PEM	-----BEGIN CERTIFICATE REQUEST----- MIIC2DCCAcACAQAwcTELMAkGA1UEBhMCVVMxCzAJBgNVBAgMAkZMMRAwDgYDVQQH DAdTdW5yaXNlMRAwDgYDVQQKDAdUZXN0aW5nMRQwEgYDVQQLDAtJbnRlZ3JhdGlv bjEbMBkGA1UEAwwSSFBFQWxsZXRyYTkwNjBVc2VyMIIBIjANBgkqhkiG9w0BAQEF AAOCAQ8AMIIBCgKCAQEA2WEXtf1+8hQRenCYNH1ng5dxrxxUrdfxPUlhzsOoBtCx Oi1B6dfSiC9uTxRIPYQHQUkvSTCU6BQLRrhHjfpb4iXSh8UBENvx7L5rn0tRpph3 gS0mdMi3mBEtfUN+PzdKCplbYl8vm75DQOld+wI3qO/7reaYQSQh0JwQZV9n3dpJ 9jdPLjN0ybe1KAIAehqwhxho9u+o+eJrGPPIZG30roKsxQu1rJZgK2xtvSszil0q 2ms8FPnJOlLRqUlFvGlu6uTbvYkm4dZJORLZKa4DuEUHJJrlCs1SU+hzRhThGPMT F4O+6U1EfeDDylmytTnaDKkDWNvVrLdgxWKixdYMKQIDAQABoCIwIAYJKoZIhvcN AQkOMRMwETAPBgNVHREECDAGhwQKDAwUMA0GCSqGSIb3DQEBCwUAA4IBAQAWItX1 71hYa0pTb2TRgWXMdTzwSRyMZbTKyKUALG/O67WLUkM1Wa9k8S9hLrCZDR5erTSu cRz1NTXiZZ5tu0Kd3DpapvKZoqPpeRf1Mf5gqDJb918S2Vz5tkUYvwgpGWY9WUPs 2uWzkGna3A4XyYyOX9WObv9EVpWO0yWvb7UfBILlpJDj74OpTHrv1Gg/2Cj1DqP9 ZHRMotplY9v22BJrGzLen5EGey2FzKVxMrQNywNYltgYRgRpGScm2XRlnKQvrfLB vxl25ML28KDtL0ZojH47m5QplQtHBAW/kAdmBhtHXWnBWSyWV9PtDuE6e3C1hjzn tNr2dX7ugdil5M9X -----END CERTIFICATE REQUEST-----

8. Create a csr file type with a text editor containing the copied certificate request. May need to rename the file using the Windows CLI to get the correct file type extension if using Notepad text editor.



3.2. Create the client certificate bundle

1. Sign in to the KMIP Vault with the URL and credentials from Create a KMIP Vault in the Entrust KeyControl.
2. Select **Security**, then **Client Certificates**.

3. In the **Manage Client Certificate** page, select the **+** icon on the right to create a new certificate. The **Create Client Certificate** dialog box appears.
4. In the **Create Client Certificate** dialog box:

    a. Check **Add Authentication for Certificate**.

    b. Enter the **User Name on Certificate**.

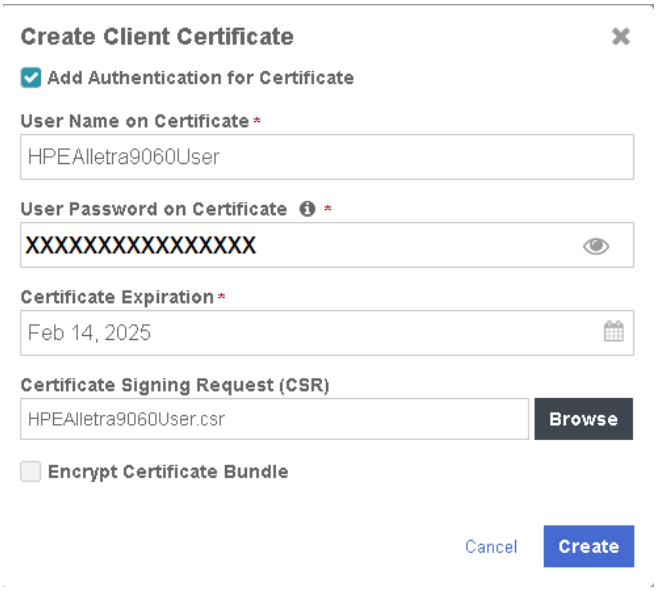
    c. Enter the **User Password on Certificate**.

    d. Enter the **Certificate Expiration**.

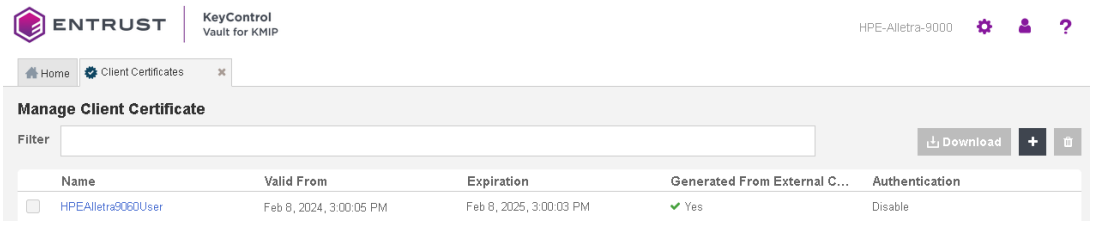
    e. Upload the certificate request created in Create the HPE Alletra certificate request.

    f. Select **Create**.

    For example:



    The new certificates are added to the **Manage Client Certificate** pane.



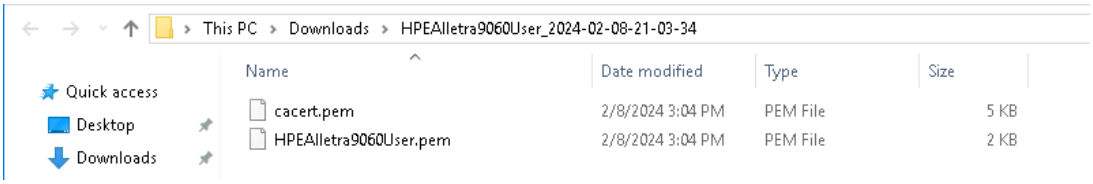
5. Select the certificate and select the **Download** icon to download the certificate.
6. Unzip the downloaded file. It contains the following:

    - A `certname.pem` file that includes both the client certificate and private key. In this example, this file is called `HPEAlletra9060User.pem`.

      The client certificate section of the `certname.pem` file includes the lines "-----BEGIN CERTIFICATE-----" and "-----END CERTIFICATE-----" and all text between them.

      The private key section of the `certname.pem` file includes the lines "-----BEGIN PRIVATE KEY-----" and "-----END PRIVATE KEY-----" and all text in between them.

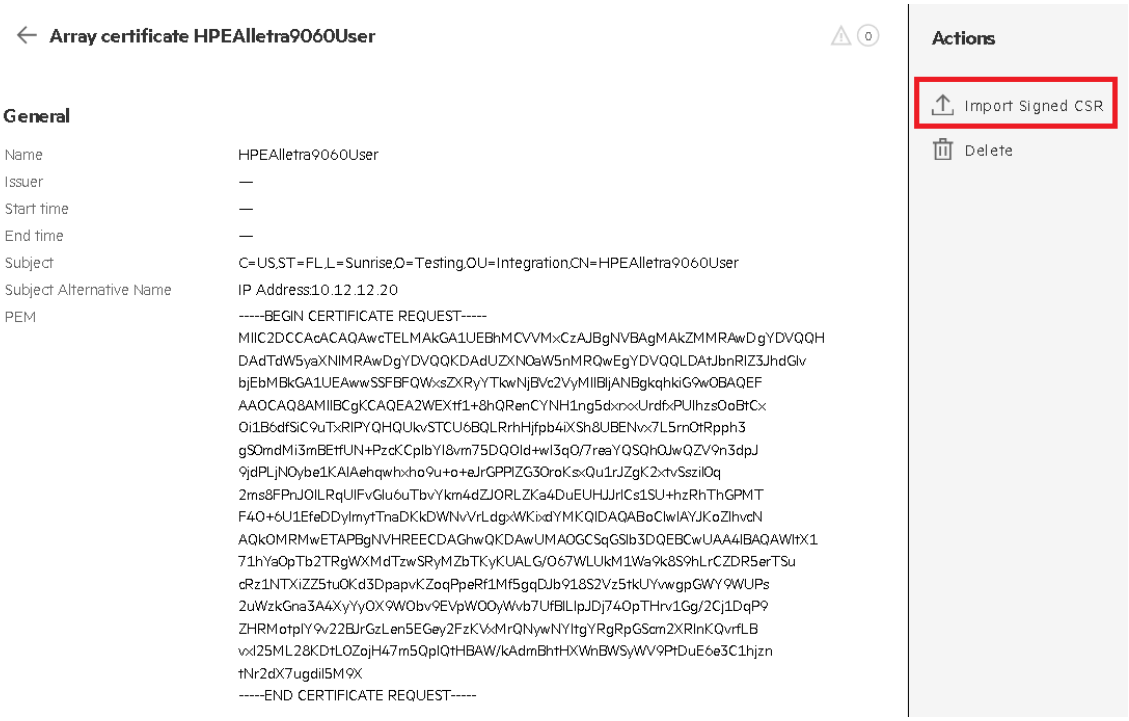
    - A `cacert.pem` file which is the root certificate for the KMS cluster. It is always named `cacert.pem`.



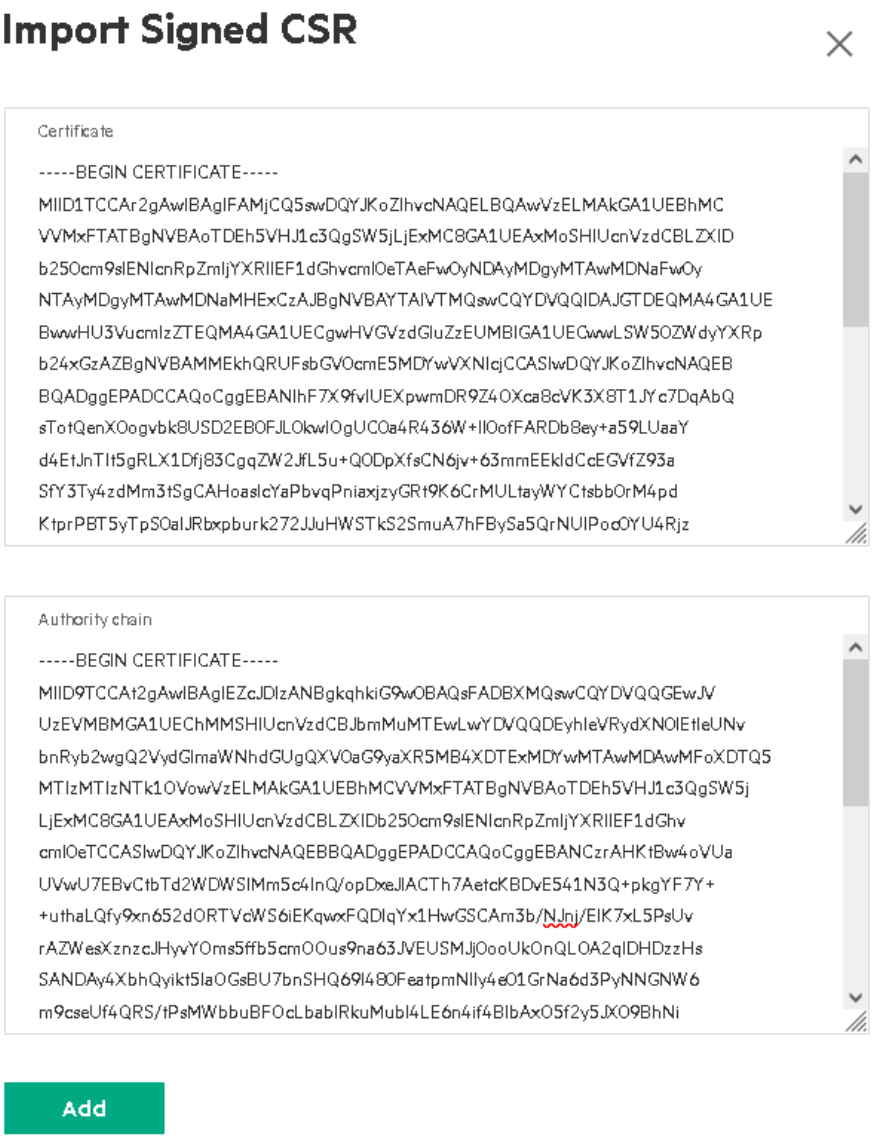
See the following link for additional information Managing KMIP Tenant Client Certificates.

3.3. Import client certificate into Alletra

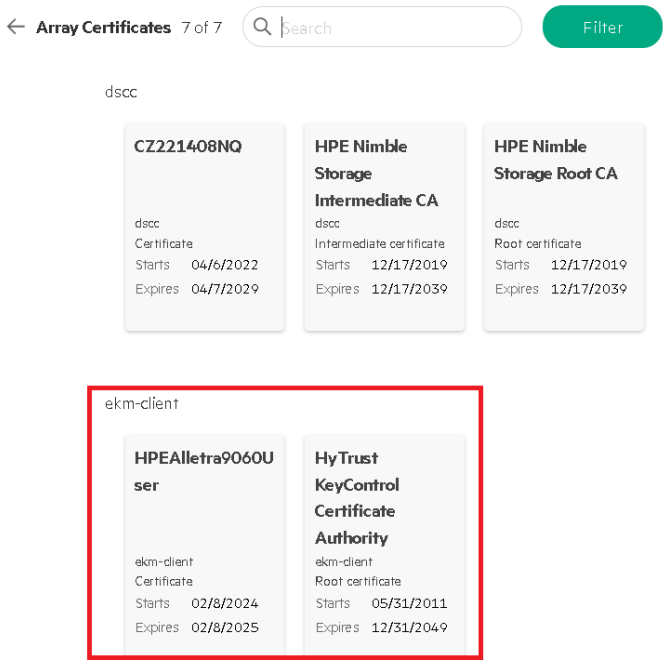
1. Sign in to the Alletra 9060 webGUI using an account with Security Admin privileges.
2. Select **Settings** in the toolbar. Then select **Array certificates**.
3. Select the certificate that was created in Create the HPE Alletra certificate request. Then select **Import Signed CSR** in the **Actions** tab.



4. Paste the content of the extracted `cacert.pem` file from Create the client certificate bundle in the **Authority chain** text box. When pasting the content, only include the certificate section of the file starting from **-----BEGIN CERTIFICATE-----** and ending with **-----END CERTIFICATE-----**.
5. Paste the content of the extracted `HPEAlletra9060User.pem` file from Create the client certificate bundle in the **Certificate** text box. Only paste the certificate section starting from **-----BEGIN CERTIFICATE-----** and ending with **-----END CERTIFICATE-----**. Then select **Add**.



6. Check **I have read and understand the implications**. Then select **Add**.
7. Notice the new status of the **Certificate** along with the **Root Certificate** now showing up beside our created certificate.



8. Launch the Alletra 9060 CLI using an account with Security Admin privileges.

```
Microsoft Windows [Version 10.0.17763.5329]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>ssh 3paradm@10.12.12.20
The authenticity of host '10.12.12.20 (10.12.12.20)' can't be established.
RSA key fingerprint is SHA256:e1K15j9xCCcQyuMTV4hOcCIW25boA9jypH1tJzAbB5I.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.12.12.20' (RSA) to the list of known hosts.
3paradm@10.12.12.20's password:
TAC1-Alletra-9060 cli%
```

9. Verify that the certificates were created with the `showcert` command.

```
TAC1-Alletra-9060 cli% showcert
Service         Commonname                                  Type   Enddate                 Fingerprint
ekm-client      HPEAlletra9060User                          cert   Feb  8 21:00:03 2025 GMT
88b20420863464063 96f6a347172aa1e52ba54ac
ekm-client*     HyTrust KeyControl Certificate Authority rootca Dec 31 23:59:59 2049 GMT
ed1e2e09efe0ef77c7546afa8b58adcba2575222
ekm-server*     HyTrust KeyControl Certificate Authority rootca Dec 31 23:59:59 2049 GMT
ed1e2e09efe0ef77c7546afa8b58adcba2575222
```

3.4. Register the Entrust KeyControl KMS

1. Launch the Alletra 9060 CLI using an account with Security Admin privileges.

```
Microsoft Windows [Version 10.0.17763.5329]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>ssh 3paradm@10.12.12.20
The authenticity of host '10.12.12.20 (10.12.12.20)' can't be established.
```

```
RSA key fingerprint is SHA256:e1K15j9xCCcQyuMTV4hOcCIW25boA9jypH1tJzAbB5I.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.12.12.20' (RSA) to the list of known hosts.
3paradm@10.12.12.20's password:
TAC1-Alletra-9060 cli%
```

2. Create an **External Key Manager Server** with the `controlencryption setekm` command in the CLI.

Notice the IP of all the nodes in the Entrust KeyControl cluster.

```
TAC1-Alletra-9060 cli% controlencryption setekm -setserver 10.12.12.200,10.12.12.201 -port 5696 -ekmuser
HPEAlletra9060User -kmipprotocols 1.3
Password for EKM user:
```

3. Verify that the external key manager has been created with the `controlencryption status -d` command.

```
TAC1-Alletra-9060 cli% controlencryption status -d
Licensed Enabled BackupSaved State  SeqNum Keystore FIPS non-SEDs FailedDisks nodeNonSED
yes      no      no          normal      0 ---      ---         0           0          0

Number of EKM servers defined: 1
EKM servers: EntrustKeyControl.tac1.net
EKM server port: 5696
EKM username: HPEAlletra9060User
KMIP Protocols: 1.3
```

4. Verify communication with the newly created External Key Management server with the `controlencryption checkekm` command to show that **EKM settings are correct**.

```
TAC1-Alletra-9060 cli%  controlencryption checkekm
EKM settings are correct.
```

Chapter 4. Test Integration

Execute the test as described in the HPE internal documentation.

Chapter 5. Integrating with an HSM

For guidance on integrating the Entrust KeyControl with a Hardware Security Module (HSM), consult with your HSM vendor. If you are using an Entrust nShield HSM, refer to the Entrust KeyControl nShield HSM Integration Guide available at Entrust documentation library.

Chapter 6. Additional resources and related products

6.1. KeyControl

6.2. Entrust products

6.3. nShield product documentation