DigiCert® Trust Lifecycle Manager

HSM installation and configuration for SafeNet

Version 1.2

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digicert®

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Table of Contents

Introduction

This document describes the installation and configuration steps for SafeNet Network HSMs to be used by the DigiCert Autoenrollment Server.

Revision History

No.	Date	Summary
1.	3 August, 2022	Version 1 published.
2.	12 October, 2022	Added support for SafeNet Data Protection On Demand (DPoD) Cloud HSM
3.	14 December, 2022	Added support for “Luna HSM Client 10.5.0”

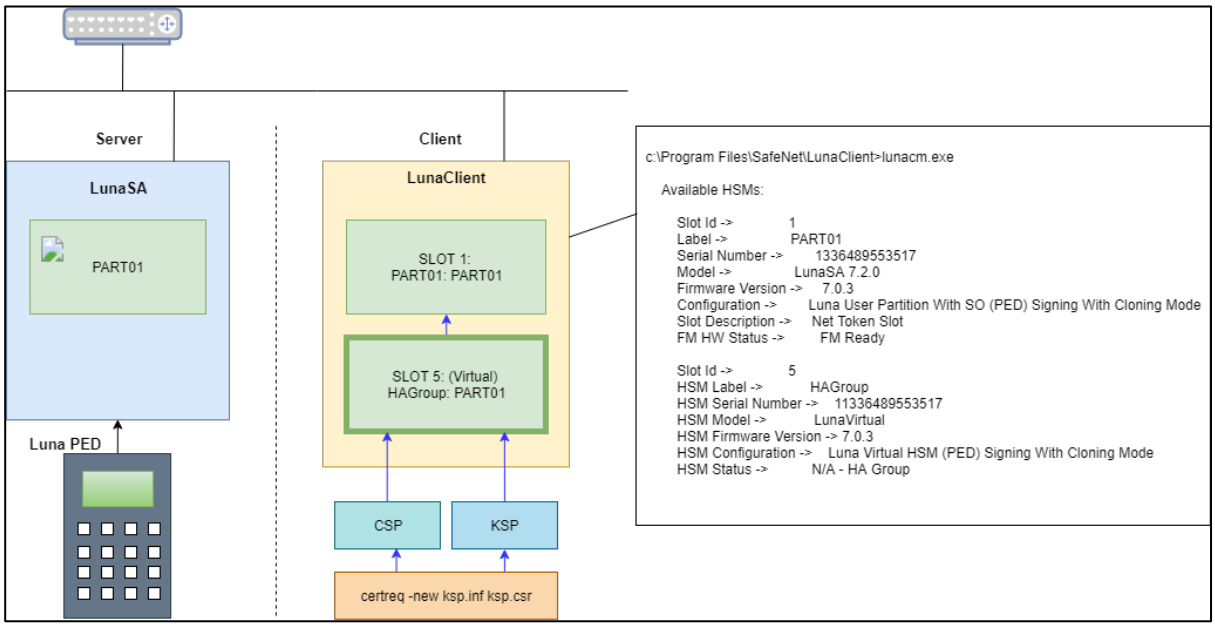
Supported HSMs

HSM Type	Client Version	Software Version	Firmware Version
SafeNet Network HSM	10.5.0-470	7.2.0	7.0.3
SafeNet DPoD Cloud HSM	10.5.0-470	7.3.0	Firmware Version -> 7.3.0 CV Firmware Version -> 1.5.0 Plugin Version -> Cloud 2.2.0-740

SafeNet Network HSM

The SafeNet Network HSM 7 (formerly known as Luna SA) is a network HSM which allows users to create a partition to store a key, such as the RA key required to strongly authenticate to the DigiCert® Trust Lifecycle Manager. It includes many features that increase security, connectivity, and ease of administration in dedicated and shared security applications.

To access the partition of SafeNet Network HSM 7, use the Luna HSM Client through Network Trust Link Service (NTLS).



Install Luna HSM Client

Follow the steps below to install the Luna HSM Client software on the client machine:

1. Run LunaHSMClient.exe as Administrator.

2. Select Install options and features.

   Check the following Luna Devices (some options and features are optional, depending on your environment):

   a) Network

   b) (Optional) Remote PED

   Check the following Features (optional features depend on your environment):

   c) CSP(CAPI) / KSP(CNG)

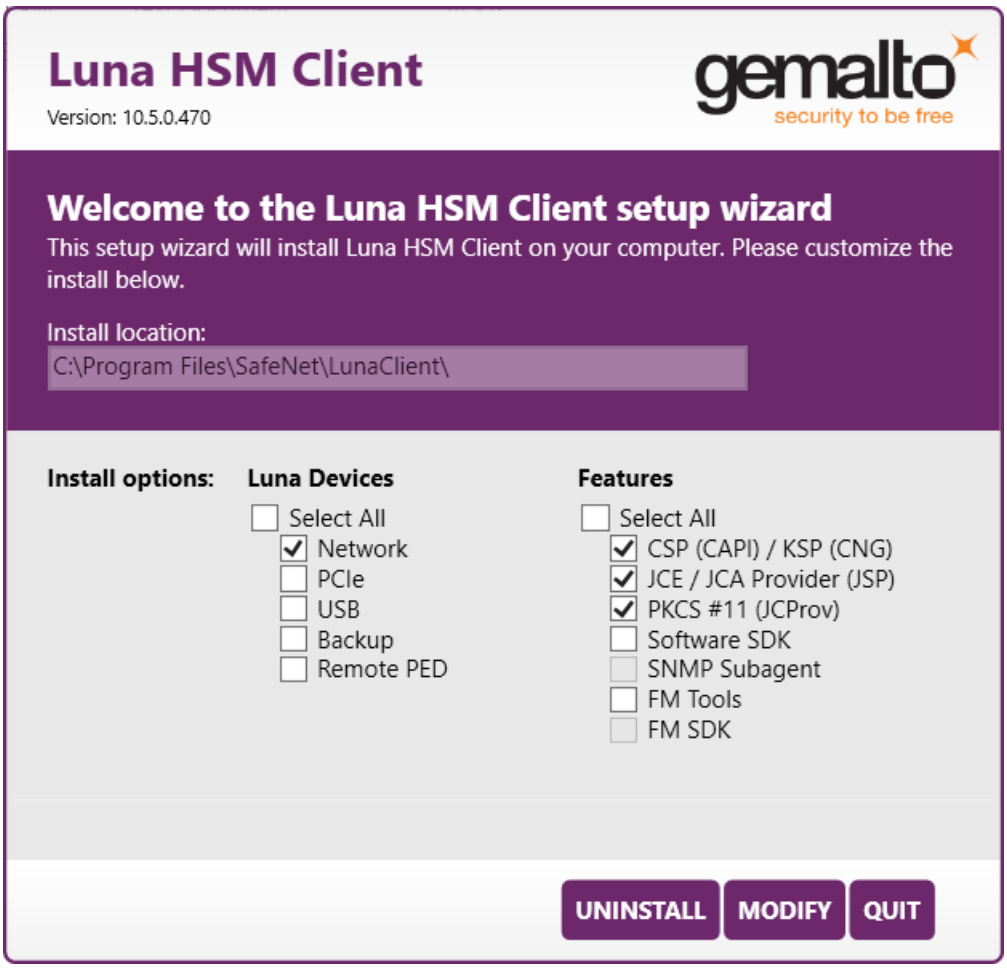
   d) (Optional) JCE / JCA Provider (JSP)

   e) (Optional) PKCS #11 (JCProv)

Check the Software License Agreement, and then select INSTALL.

3. Wait for completion. The progress bar is displayed at the bottom of the window.

4. Once the installation is complete, select OK. The UNINSTALL and MODIFY button is displayed. Select QUIT.



Configure Luna HSM Client

Before following the steps listed below, a partition must be created. This is referred to as <PARTITION-NAME> throughout this document.

Follow these steps to configure the Luna HSM Client:

1. Open a Command Prompt window and run the following commands:

```
> cd C:\Program Files\SafeNet\LunaClient
> lunacm.exe
```

2. Create a Network Trust Link (NTL) - this is a one-step setup. If you have already created an NTL, proceed to step 4.

```
lunacm:> clientconfig deploy -server <SERVER-HOSTNAME> -client <CLIENT-
HOSTNAME> -par <PARTITION-NAME>
Please wait while we set up the connection to the HSM. This may take several
minutes...
Please enter appliance admin role user's password:
Command Result : No Error
```

```
lunacm.exe (64-bit) v10.5.0-470. Copyright (c) 2022 SafeNet. All rights
reserved.
        Slot Id ->              1
        Label ->                <PARTITION-NAME>
        Serial Number ->        1314971349473
        Model ->                LunaSA 7.2.0
        Firmware Version ->     7.0.3
        Configuration ->        Luna User Partition With SO (PED) Signing
With Cloning Mode
        Slot Description ->     Net Token Slot
        FM H Status ->         FM Ready

        Current Slot Id: 1

lunacm:> clientconfig v

The following Luna SA Slots/Partitions were found:

Slot    Serial #                Label
====    ================        =====
   1       1314971349473        <PARTITION-NAME>

Command Result : No Error
```

3. If you do not want to follow the one step setup (Step 2 above), follow these steps:

   a) Obtain the Server certificate.

   The Server certificate has been created on the HSM, so it needs to be copied from the server.

```
> pscp -scp admin@<SERVER-HOSTNAME>:server.pem
```

   b) Add a Server for the Client side.

```
> vtl addServer -n <SERVER-HOSTNAME> -c server.pem
New server <SERVER-HOSTNAME> successfully added to server list.
```

   c) Create a Client certificate.

```
> vtl createCert -n <CLIENT-HOSTNAME>
Private Key created and written to: C:\Program
Files\SafeNet\LunaClient\cert\client\<CLIENT-HOSTNAME>Key.pem
Certificate created and written to: C:\Program
Files\SafeNet\LunaClient\cert\client\<CLIENT-HOSTNAME>.pem
```

   d) Upload the Client certificate to the Server.

```
> pscp -scp cert\client\<CLIENT-HOSTNAME>.pem admin@<SERVER-HOSTNAME>:
admin@<SERVER-HOSTNAME>'s password:
<CLIENT-HOSTNAME>.pem         | 1 kB |   1.1 kB/s | ETA: 00:00:00 | 100%
```

   Next, at the Server:

e) Register the Client and connect to the HSM via SSH.

```
lunash:> client register -client <CLIENT-HOSTNAME> -hostname <CLIENT-
HOSTNAME>
'client register' successful.
Command Result : 0 (Success)
```

f) Assign a partition to a Client and connect to the HSM via SSH.

```
lunash:> client assignPartition -client <CLIENT-HOSTNAME> -partition
<PARTITION-NAME>
'client assignPartition' successful.
Command Result : 0 (Success)
```

Now, at the Client:

4. Confirm connection settings.

   The working directory is "C:\Program Files\SafeNet\LunaClient"

```
> vtl listServers
Server: <SERVER-HOSTNAME> HTL required: no

> vtl verify
vtl (64-bit) v10.5.0-470. Copyright (c) 2022 SafeNet. All rights reserved.

The following Luna SA Slots/Partitions were found:

Slot    Serial #               Label
====    ================       =====
  1 1314971349473              <PARTITION-NAME>
```

5. Configure logging (optional). The working directory is "C:\Program Files\SafeNet\LunaClient". The name of the log folder is "c:\temp" in the following example and it can be changed.

```
> vtl logging configure c:\temp
Success setting log path to c:\temp
> vtl logging show
Client logging written to: c:\temp\LunaCryptokiLog.htm
```

Configure HA (High Availability)

1. Create an HA Group.

   Open a Command Prompt window and run the following client commands:

```
> cd C:\Program Files\SafeNet\LunaClient
> lunacm.exe
lunacm:> slot set -s <SLOT-NUMBER>
lunacm:> hagroup creategroup -se <SERIALNUMBER> -label <HA-LABEL>

Enter the password: ************
```

```
New group with label "HAGroup" created with group number <SERIALNUMBER>.
Group configuration is:

HA Group Label: <HA-LABEL>
HA Group Number: 11336489553517
HA Group Slot ID: Not Available
Synchronization: enabled
Group Members: 1336489553517
Needs sync: no
Standby Members: <none>

Slot # Member S/N Member Label Status
====== ========== ============ ======
1 1336489553517 <PARTITION-NAME>alive

Command Result : No Error

lunacm.exe (64-bit) v10.5.0-470. Copyright (c) 2022 SafeNet. All rights
reserved.

Available HSMs:

Slot Id -> 1
Label -> <PARTITION-NAME>
Serial Number -> 1336489553517
Model -> LunaSA 7.2.0
Firmware Version -> 7.0.3
Configuration -> Luna User Partition With SO (PED) Signing With Cloning Mode
Slot Description -> Net Token Slot
FM HW Status -> FM Ready
Slot Id -> 5
HSM Label -> <HA-LABEL>
HSM Serial Number -> 11336489553517
HSM Model -> LunaVirtual
HSM Firmware Version -> 7.0.3
HSM Configuration -> Luna Virtual HSM (PED) Signing With Cloning Mode
HSM Status -> N/A - HA Group

Current Slot Id: 1
```

Note: Both “Configure CSP” and “Configure KSP” must be configured again if you run the steps above.

---

2. Enable "HA Only"

```
lunacm:> slot set -s <HA-SLOT-NO>
        Current Slot Id:    <HA-SLOT-NO>     (Virtual HSM 7.0.3 (PED) Signing
With Cloning Mode)
Command Result : No Error

lunacm:> hagroup ho -e
        "HA Only" has been enabled.
Command Result : No Error
```

```
lunacm:> hagroup ho -s
        This system is configured to show only HA slots.  (HA Only is
enabled)
Command Result : No Error
```

Configure CSP

Note: For the deployment of the Autoenrollment Server, you need to configure CSP.

For SafeNet CSP, the utility **register.exe** (64-bit version) takes care of the registry. To configure CSP, open a Command Prompt window and run the following commands:

Register CSP Library

```
C:\Program Files\SafeNet\LunaClient\CSP>register.exe /library

register.exe (64-bit) v10.5.0-470. Copyright (c) 2022 SafeNet. All rights
reserved.

Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
enhanced RSA and AES provider for Microsoft Windows.
Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
Cryptographic Services for Microsoft Windows.
Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
SChannel Cryptographic Services for Microsoft Windows.
```

Register the partition

```
C:\Program Files\SafeNet\LunaClient\CSP>register.exe

register.exe (64-bit) v10.5.0-470. Copyright (c) 2022 SafeNet. All rights
reserved.

 ********************************************************************************
 *                                                                              *
 *       Safenet LunaCSP, Partition Registration                                *
 *                                                                              *
 *       Protect the HSM's challenge for the selected partitions.               *
 *                                                                              *
 *       NOTE:                                                                  *
 *            This is a WEAK protection of the challenge.                       *
 *            After you have configured all applications that will use          *
 *            the LunaCSP and ran them once, you MUST run:                      *
 *                register /partition /strongprotect                            *
 *            to strongly protect the registered challenges.                    *
 *                                                                              *
 ********************************************************************************

This is a destructive procedure and will overwrite any previous
registrations.

Do you wish to continue?: [y/n]y
Do you want to register the partition named '<PARTITION-NAME>'?[y/n]: y
```

```
Enter challenge for partition '<PARTITION-NAME>' : <Only hit "Enter" then the
PED Authentication will be requested>

Success registering the ENCRYPTED challenge for partition '<PARTITION-
NAME>:1'.
Only the LunaCSP will be able to use this data.

Registered 1 partition(s) for use by the LunaCSP.
```

Register the HA partition

Run the following commands if HA is configured.

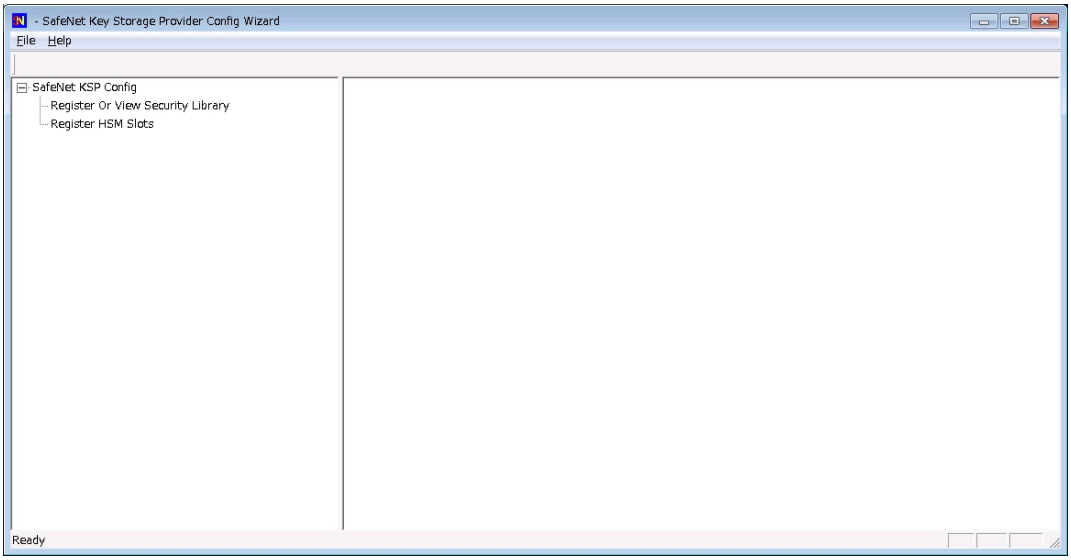
```
c:\Program Files\SafeNet\LunaClient\CSP>register.exe /h
register.exe (64-bit) v10.5.0-470. Copyright (c) 2022 SafeNet. All rights
reserved.

 ********************************************************************************
 *                                                                              *
 *       Safenet LunaCSP, Partition Registration                                *
 *                                                                              *
 *       Protect the HSM's challenge for the selected partitions.               *
 *                                                                              *
 *       NOTE:                                                                  *
 *            This is a WEAK protection of the challenge.                       *
 *            After you have configured all applications that will use          *
 *            the LunaCSP and ran them once, you MUST run:                      *
 *                register /partition /strongprotect                            *
 *            to strongly protect the registered challenges.                    *
 *                                                                              *
 ********************************************************************************

This is a destructive procedure and will overwrite any previous
registrations.

Do you wish to continue?: [y/n]y
Do you want to register the partition named '<HA-LABEL>'?[y/n]: y
Enter challenge for partition '<HA-LABEL>' :************

Success registering the ENCRYPTED challenge for partition '<HA-LABEL>:1'.
Only the LunaCSP will be able to use this data.

Registered 1 partition(s) for use by the LunaCSP.
```

Configure KSP

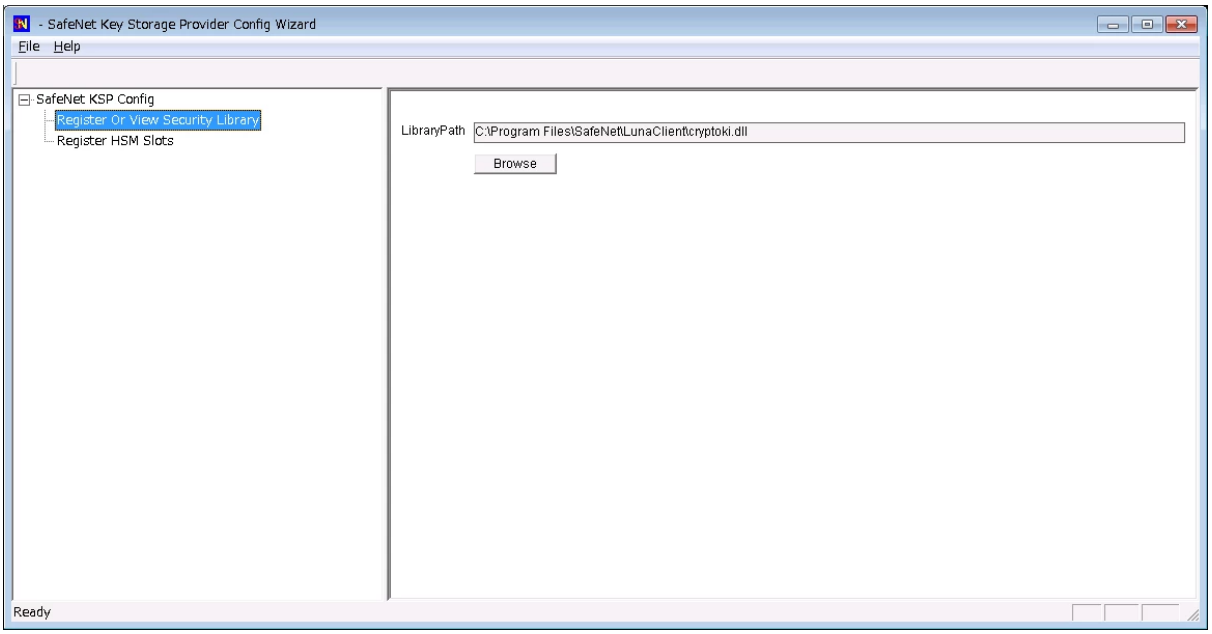
To configure KSP (CNG), run KspConfig.exe (the default location is "C:\Program Files\SafeNet\LunaClient\KSP\").

Follow instructions for the use of the graphical **KspConfig.exe** as described in KSP for CNG in the SDK Reference Guide.

The following window will appear:



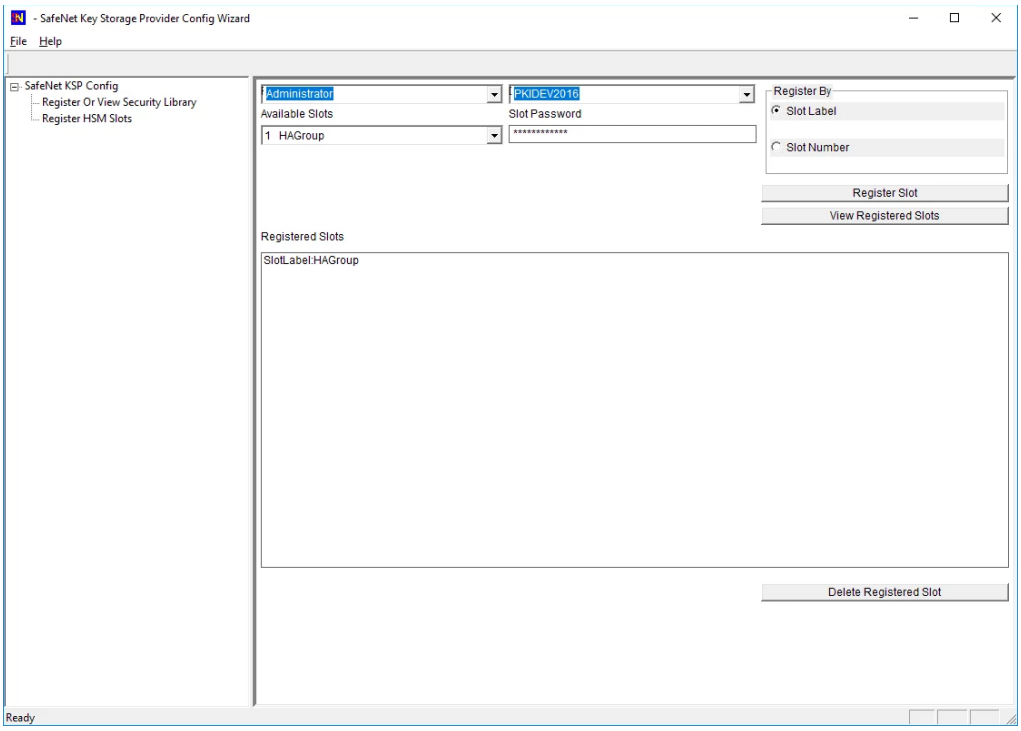
Double-click **Register Or View Security Library**, then confirm the value "**C:\Program Files\SafeNet\LunaClient\cryptoki.dll**".



Double-click **Register HSM Slots** for Administrator/<Domain Name>

- Select Administrator
- Select <Domain Name>
- Select "HA Group" for **Available Slots**
- Enter Slot Password

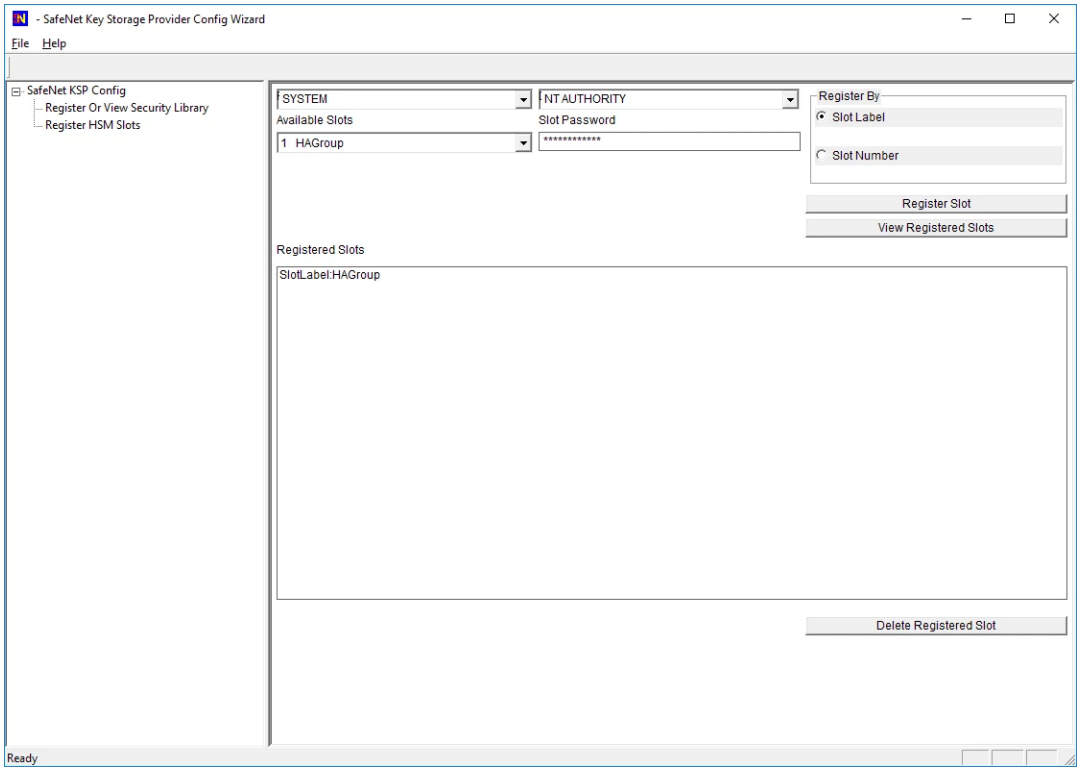
Select **Register Slot**.



Double-click **Register HSM Slots** for SYSTEM/NT AUTHORITY.

- Select SYSTEM
- Select NT AUTHORITY
- Select "HA Group" for **Available Slots**
- Enter Slot Password

Select **Register Slot.**



Note: When you click "**Register Slot**", there is no change on "Registered Slot", but this step is necessary.

When registering the Luna KSP (with the Luna KSPConfig utility), use the following user and domain combinations:

- The user and domain performing these procedures.
- The user and domain running the web application and using the private key.
- The local user and NT Authority domain user.
- The LocalSystem and NTAuthority of the system.

Note: If you implement the Autoenrollment server, you must also install and register the Luna CSP. Refer to the SafeNet product documentation for details.

Generate CSR

1. Create the information file for the CSR. To generate the CSR using certreq.exe through CSP, the ProviderName must be "**Luna Cryptographic Services for Microsoft Windows**". The .inf file looks as follows:

```
[NewRequest]
KeyUsageProperty = "NCRYPT_ALLOW_ALL_USAGES"
RequestType = PKCS10
ProviderName = "Luna Cryptographic Services for Microsoft Windows"
ProviderType = 1
Subject = "CN=Registration Authority"
KeyContainer = "CSPRA20220725"
MachineKeySet = TRUE
HashAlgorithm = SHA256
KeyAlgorithm = RSA
KeyLength = 2048
```

2. Generate the CSR through HSM.

Note: <inf-file> is the file created in step 1, **<csr-file>** is an output file.

---

a) Open command prompt and run the following command:

```
> certreq -new <inf-file> <csr-file>
```

b) The CSR file will be generated as follows;

```
-----BEGIN NEW CERTIFICATE REQUEST-----
MIIDjzCCAncCAQAwITEfMB0GA1UEAwwWUmVnaXN0cmF0aW9uIEF1dGhvcml0eTCC
....
C610uaqncn6FvLu5pygZYFEVtOanCXNQRRUWiDGWKjHF+10GMh+V5YUur55T4W80
0uwK
-----END NEW CERTIFICATE REQUEST-----
```

3. Get a client authentication certificate

   Refer section Get a client authentication certificate

4. Install RA certificate

   Refer section Install RA certificate

Refer to the "**Configure the Autoenrollment Server**" section of the **DigiCert® Autoenrollment Server Deployment Guide** in this KB article for more information.

SafeNet DPoD Cloud HSM

The SafeNet DPoD (**Data Protection on Demand)** service provides "HSM on Demand" which is one of HSM's on Demand Services. This section introduces how to generate key on Cloud HSM and use it. Please see the SafeNet Official Guide if you need details or other information. Click "  " icon on your site on SafeNet DPoD Service, to avail the guide.

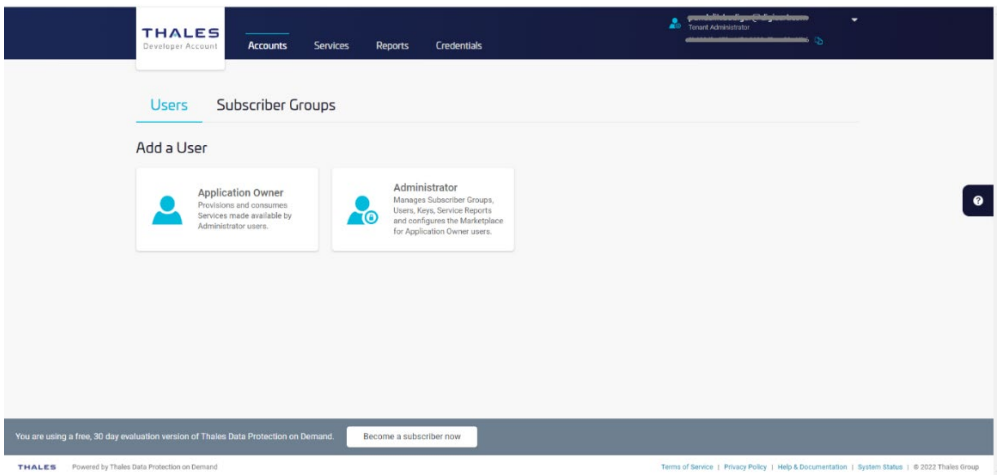
Before proceeding, we should understand the 3 types of users in the DPoD role hierarchy which are as follows:

No	Type	Responsibility	Note
1	Service Provider Administrators	Managing and distributing additional DPoD tenants.	On this document, there is no description about this user. Please see the SafeNet Official Guide.
2	Tenant Administrators	Managing an enterprise tenant and distributing cryptographic resources in the form of services to application owners.	The user can create, subscribe group and Application Owner, and configure services.
3	Application Owners	Managing cryptographic services, and consuming cryptographic resources in an enterprise tenant.	

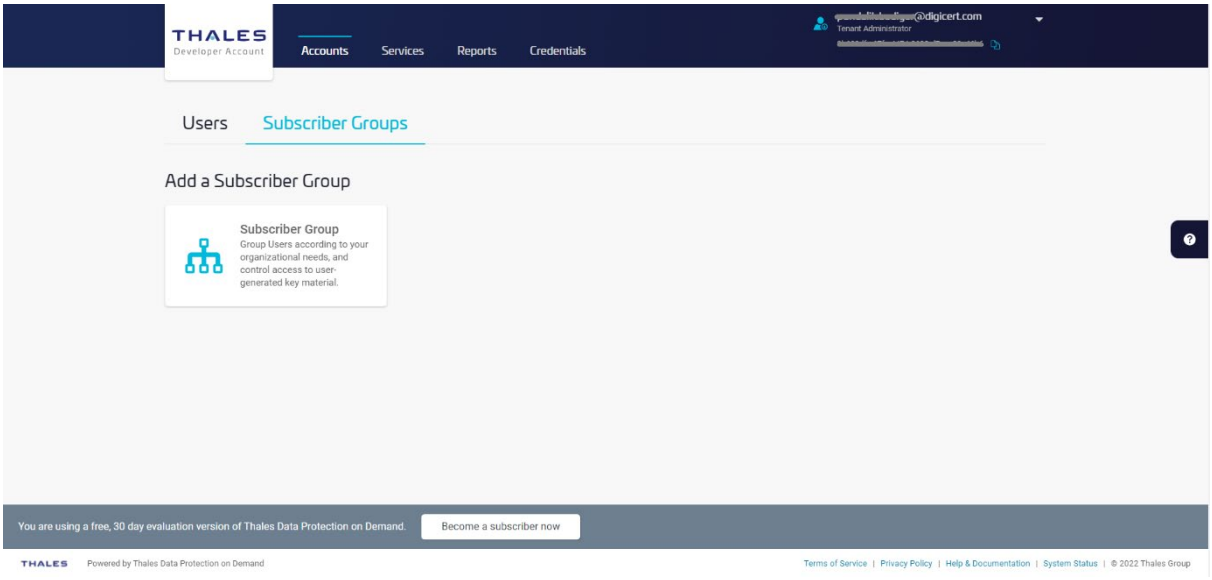
Install LunaClient

Add a Subscriber Group as Tenant Administrator

1. Sign in to DPoD site using your Tenant Administrator credential.

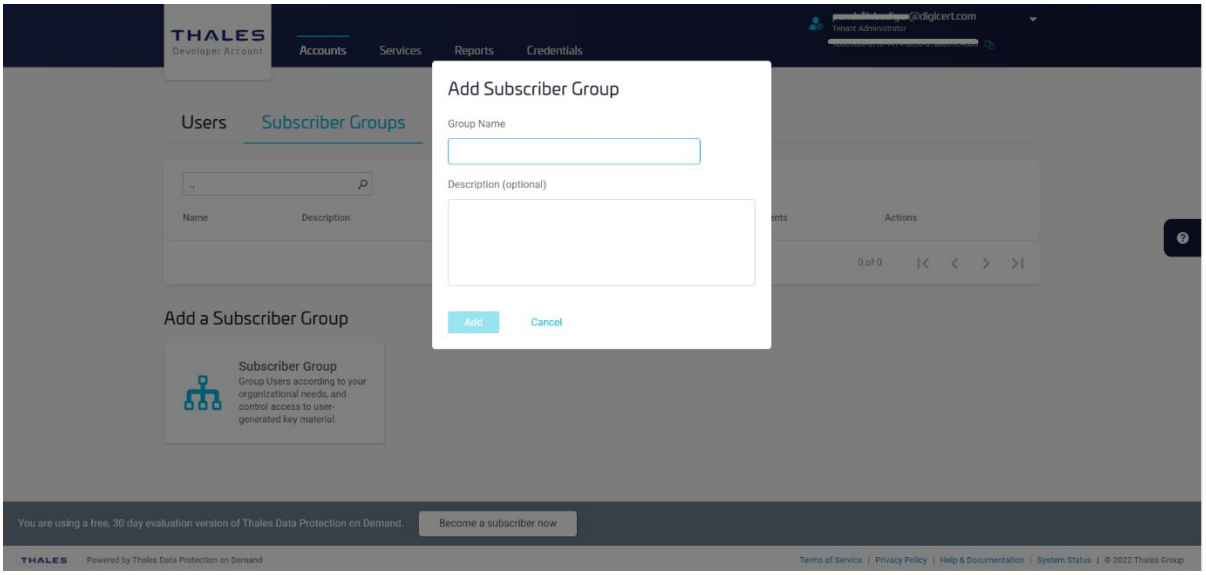


2. Select **Subscriber Groups** followed by **Subscriber Group** tile.

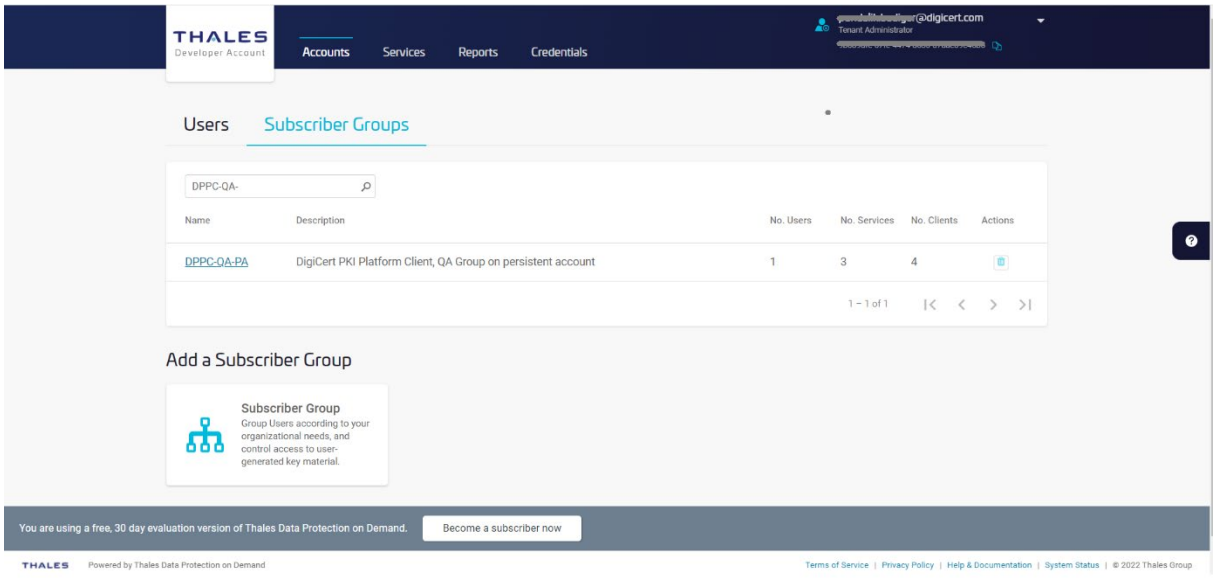


3. Enter **Group Name** and **Description** and then click **Add**.

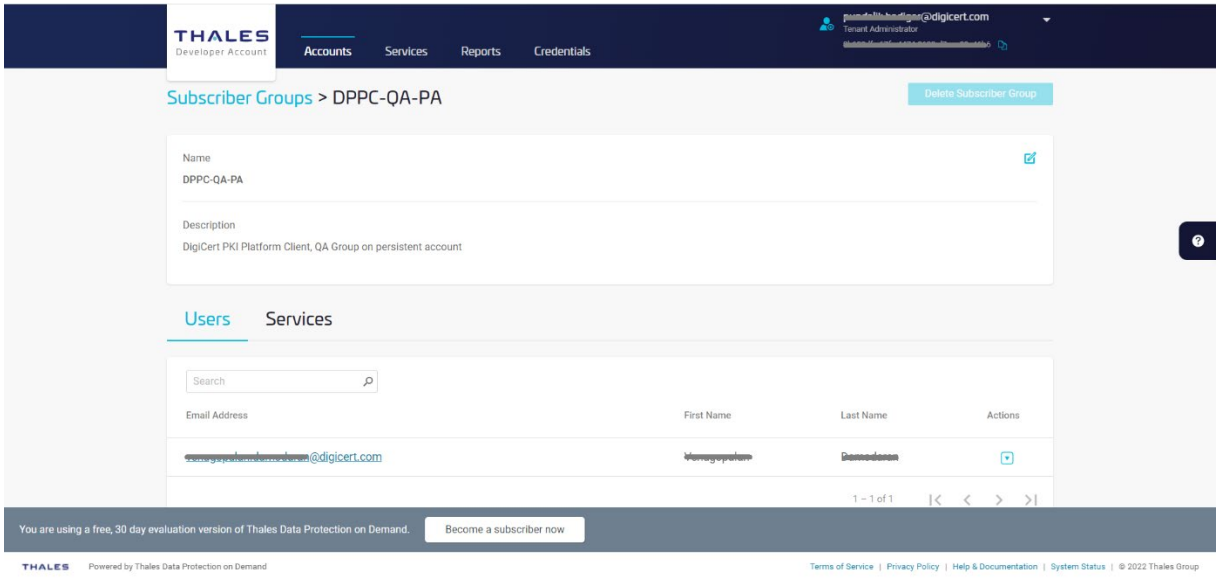
   In this document, **Group Name** is **DPPC-QA** but you can use any other value.



4. The designated group has been created.

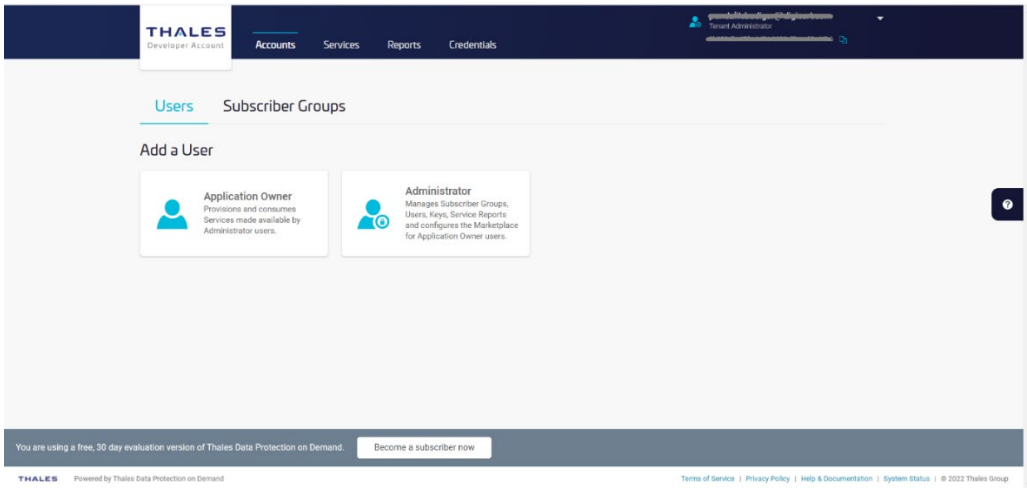


5. Click on the link of group which has been created to view the Group details.

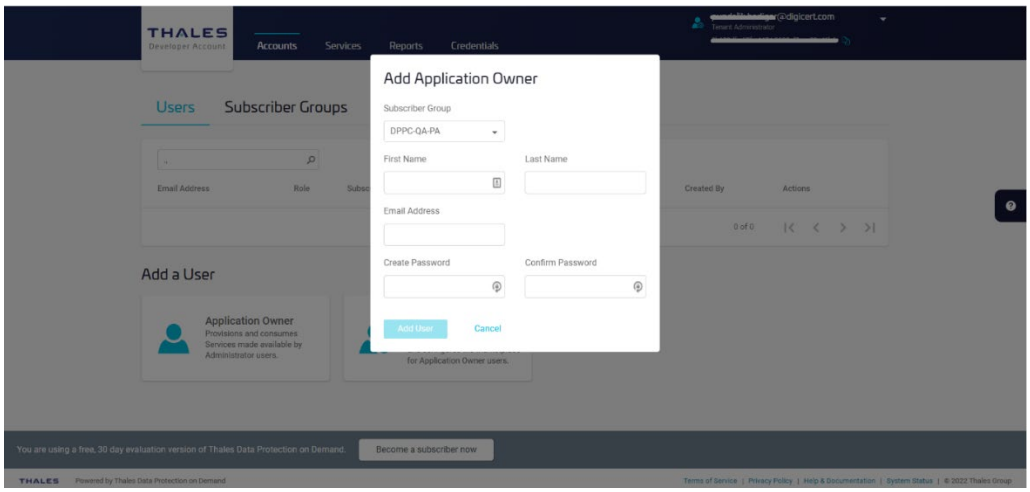


Add an Application Owner as Tenant Administrator

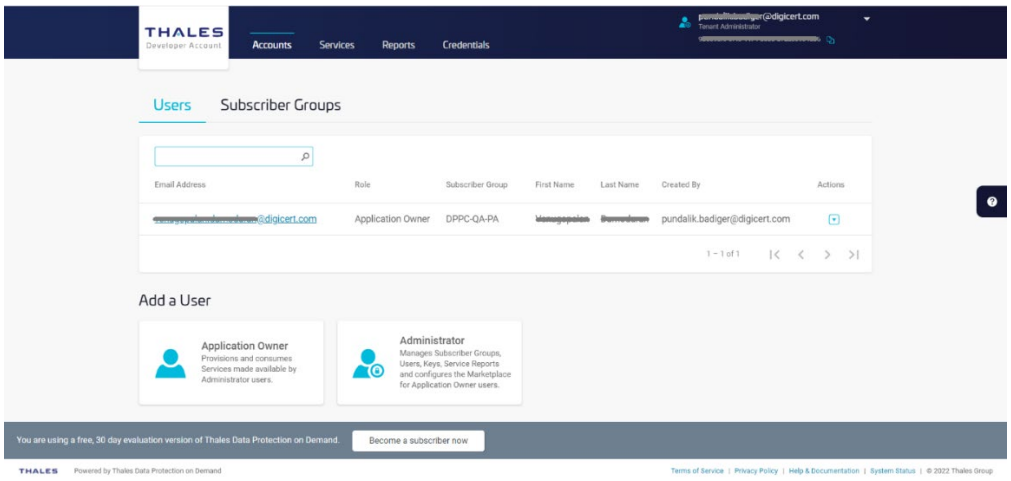
1. Sign in to DPoD site using your Tenant Administrator credential. Select **Accounts** tab and Select **Users** and Select **Application Owner**, under **Add a User**.



2. Fill out the form with the user details and then click **Add User**.

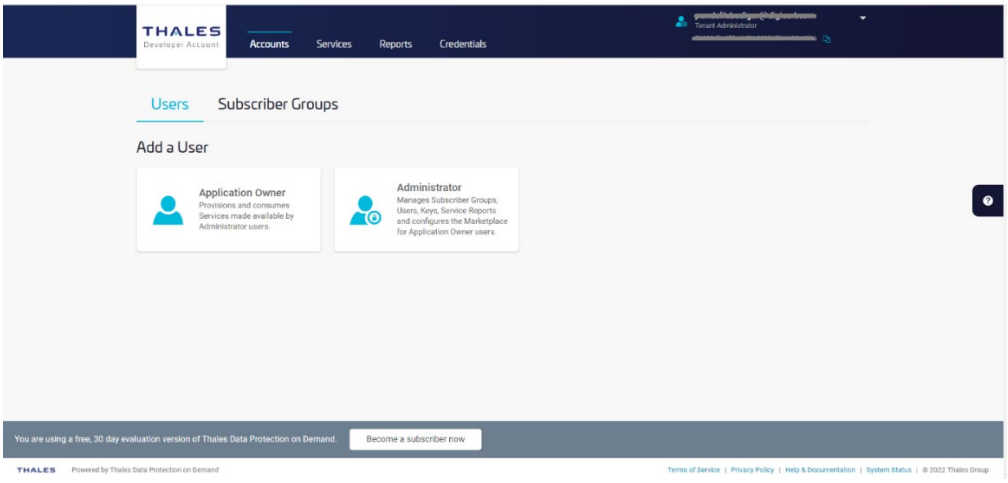


3. The user has been created.

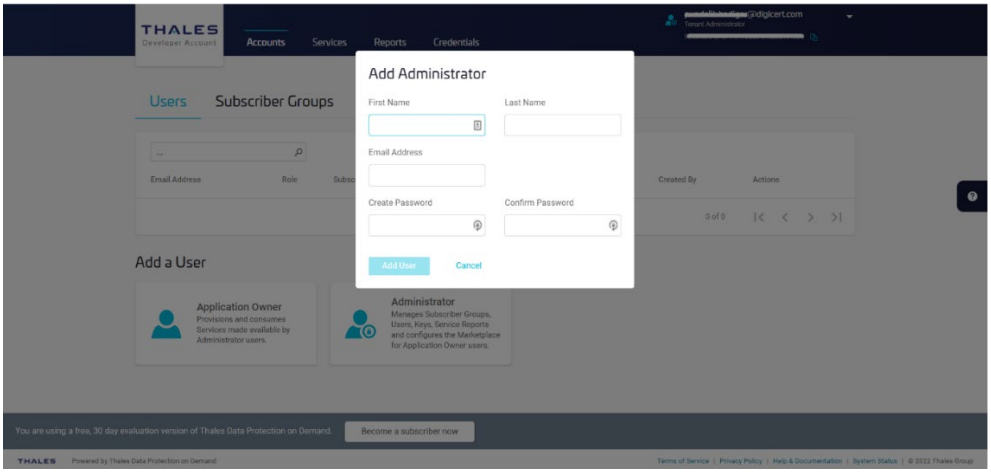


Add Administrator as Tenant Administrator

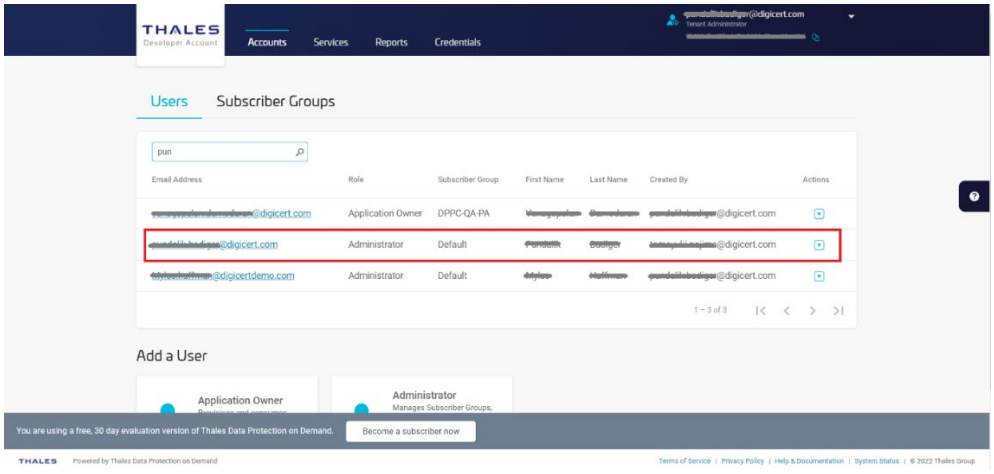
1. Sign in DPoD site and Select **Accounts** tab and select **Users** and select **Administrator**, under **Add a User**.



2. Fill out the form with the Administrator details then click **Add User**.

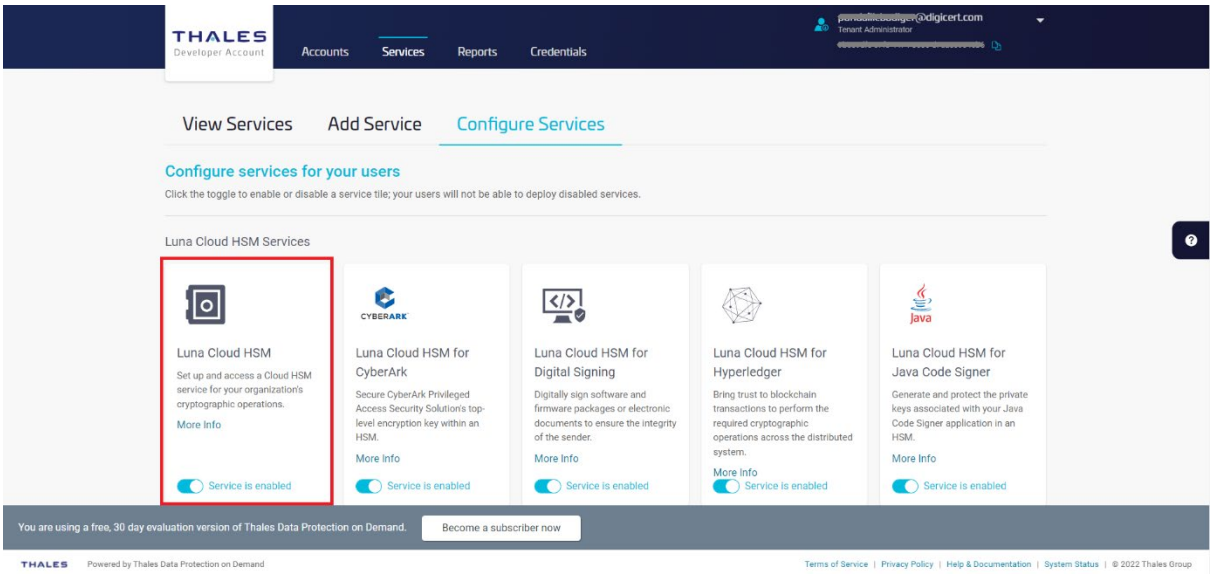


3. The Administrator has been created.



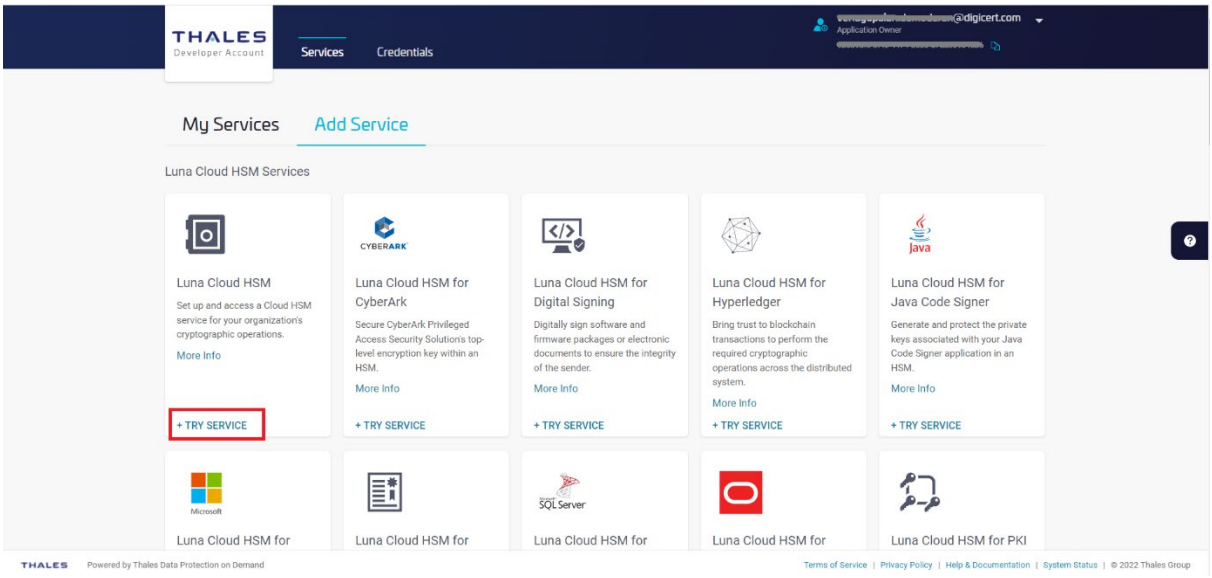
Enable Luna Cloud HSM Services as Tenant Administrator

1. Select **Services** tab then click on **Configure Services**.
2. Under the **Luna Cloud HSM** service tile (Set up and access a Cloud HSM service for your organization's cryptographic operations), click the toggle to enable service.



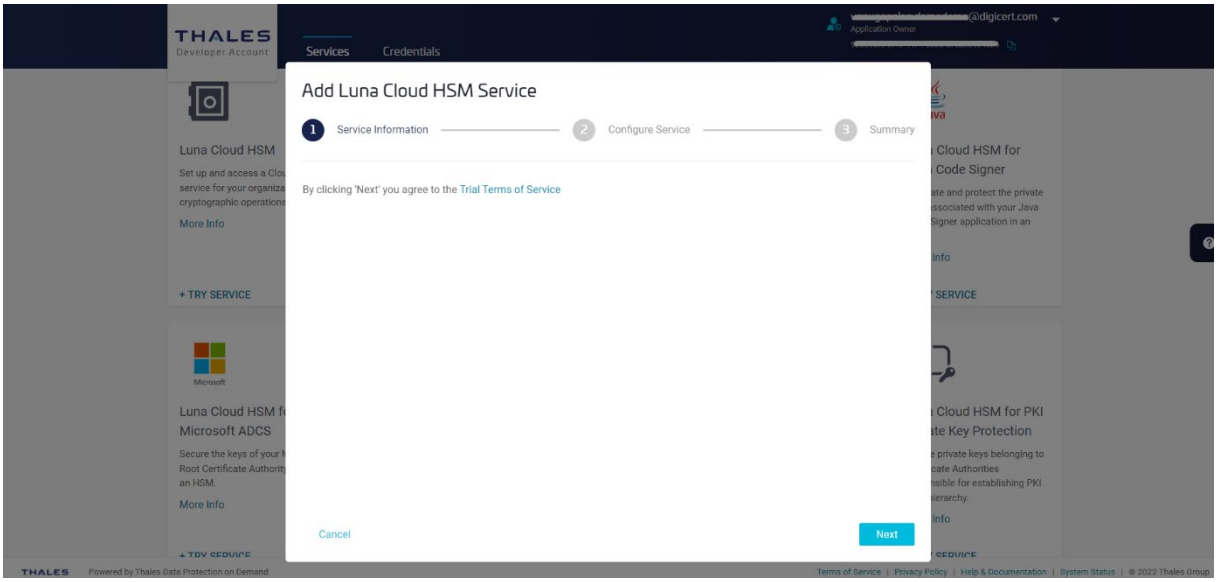
Add New Services and Service Client as Application Owner

1. Sign in as an Application Owner and then select **Add New Service** and click on **+TRY SERVICE** under the **Luna Cloud HSM** service tile.



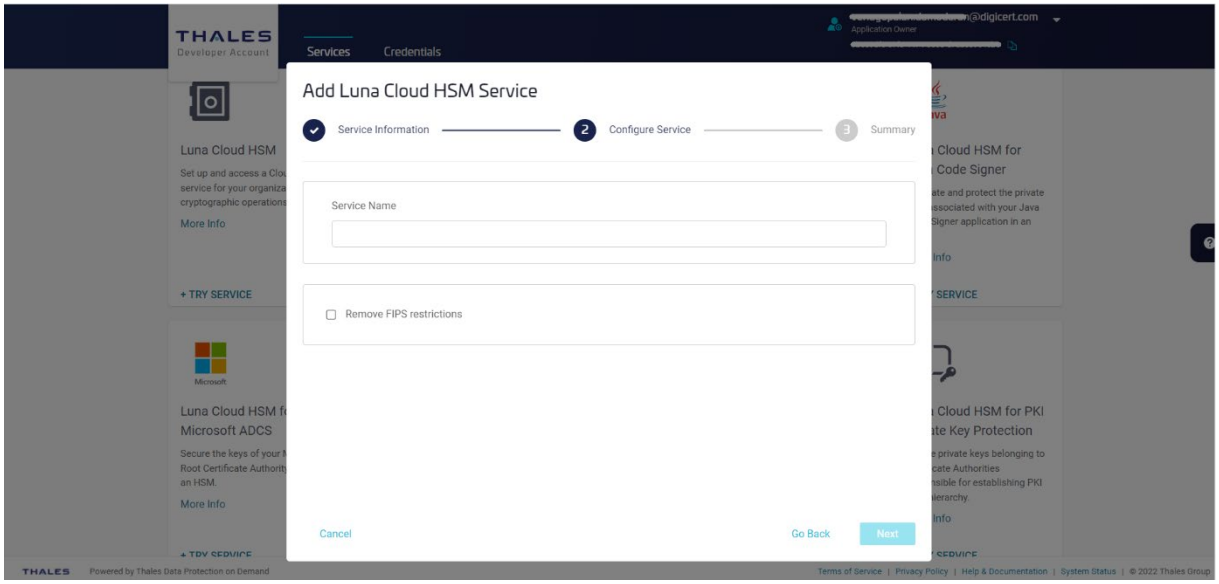
- Step 1: Service Information.

  Click **Next** (By clicking 'Next' you agree to the *Trial Terms of Service*)



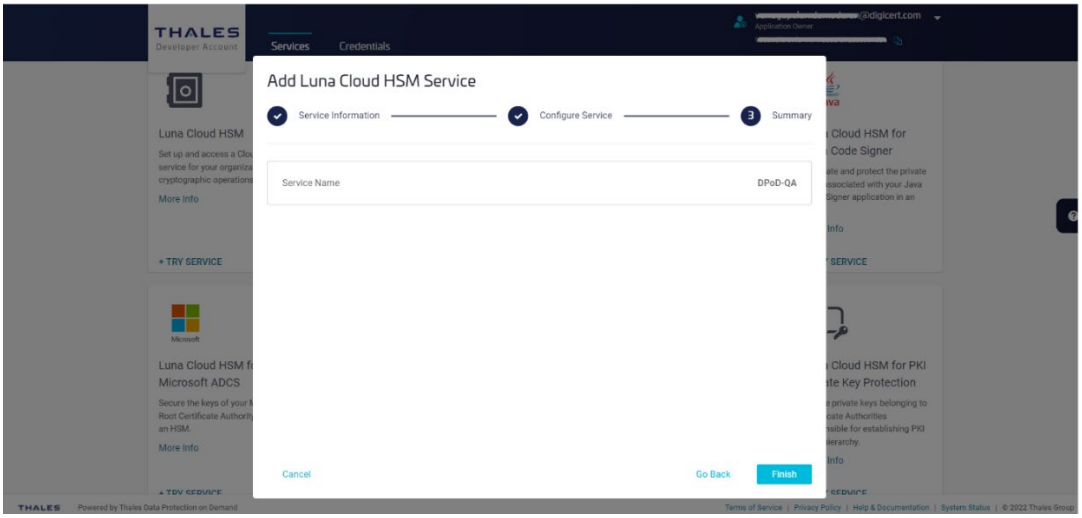
- Step 2: Configure Service.

  Enter **Service Name** and check if you wish to opt for **Remove FIPS restrictions**, and then click **Next**.

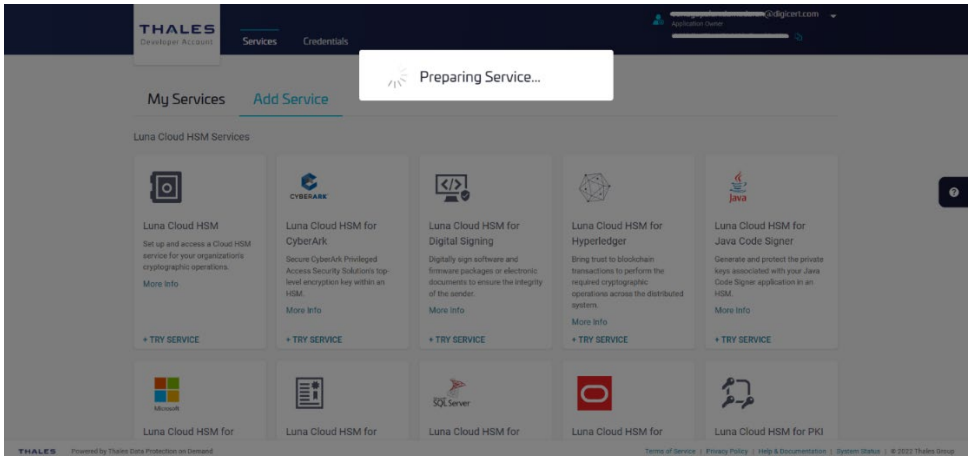


- **Step 3:** Summary

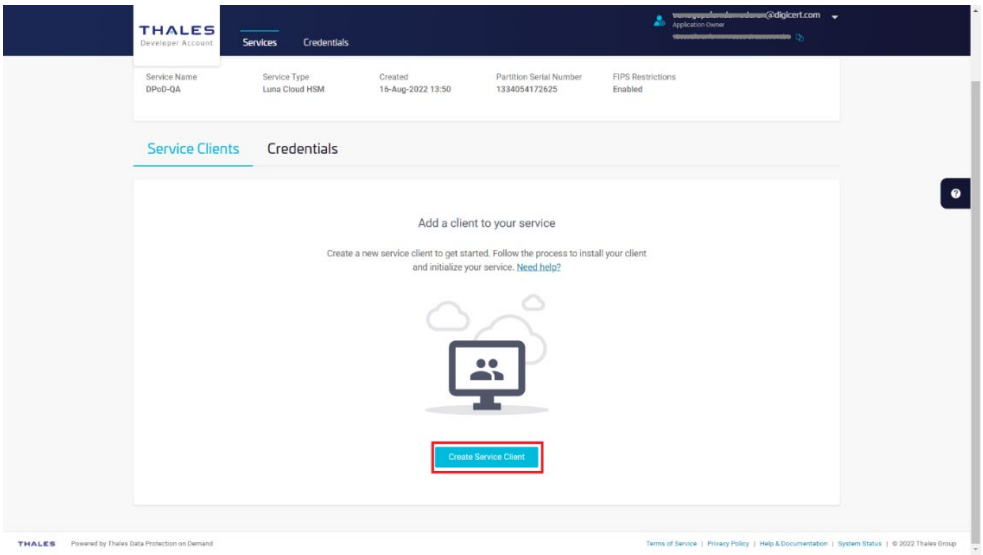
  Confirm your Service Name and click **Finish**.



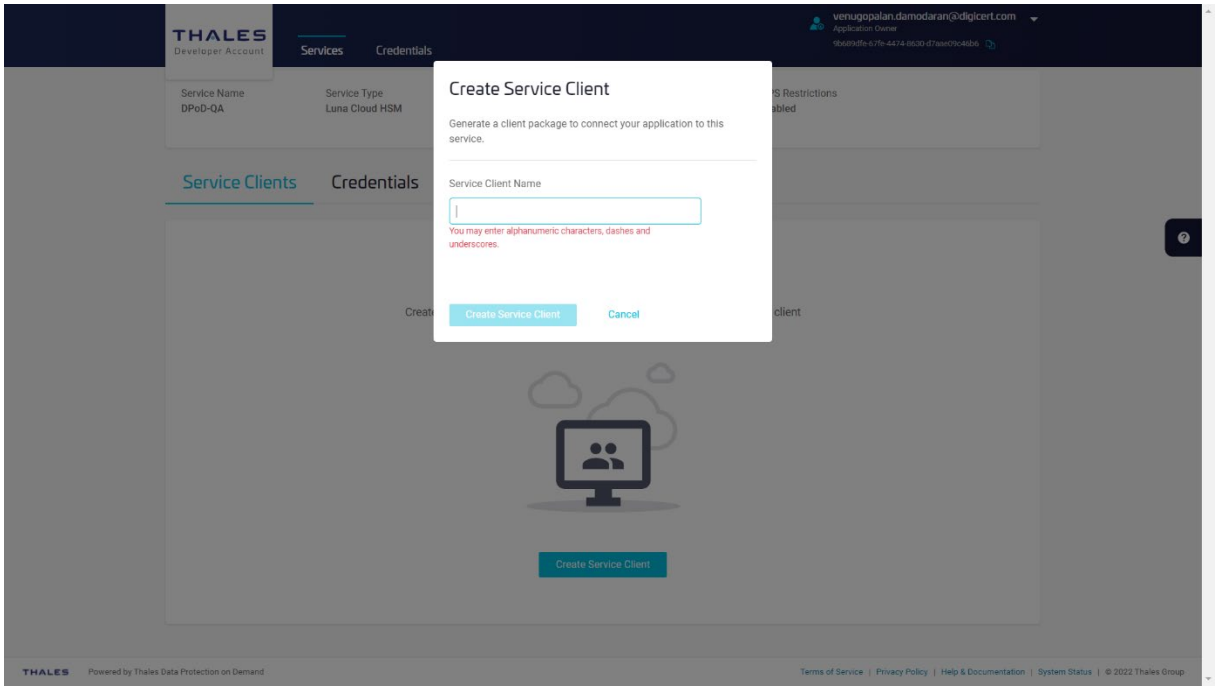
2. It takes several seconds for processing.



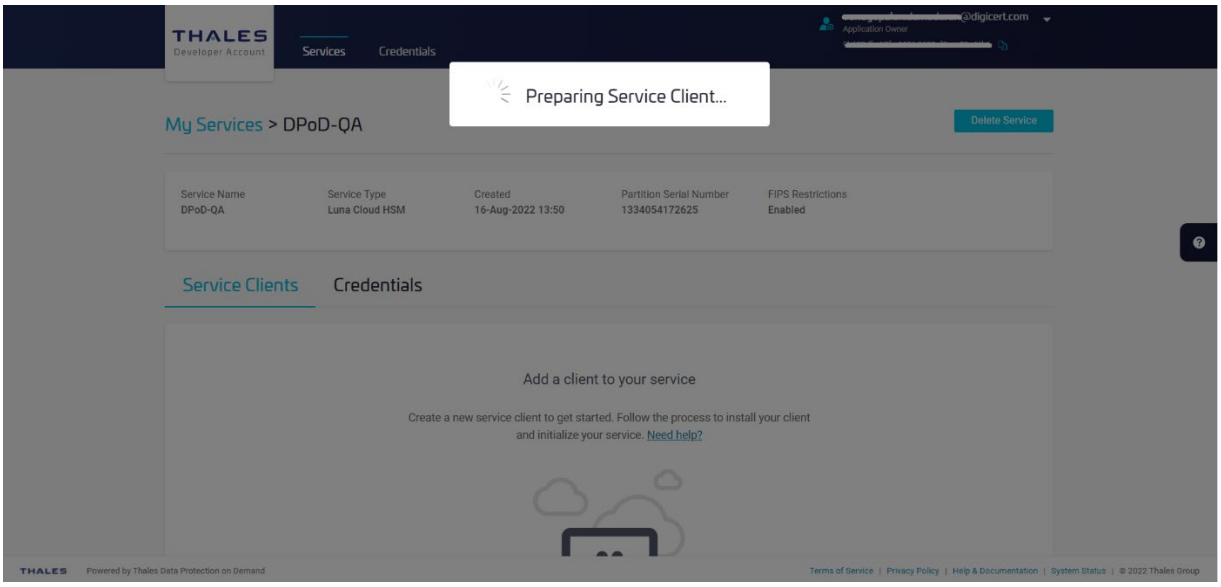
3. Click **Create Service Client**.



4. Enter **Service Client Name** and then click **Create Service Client**.

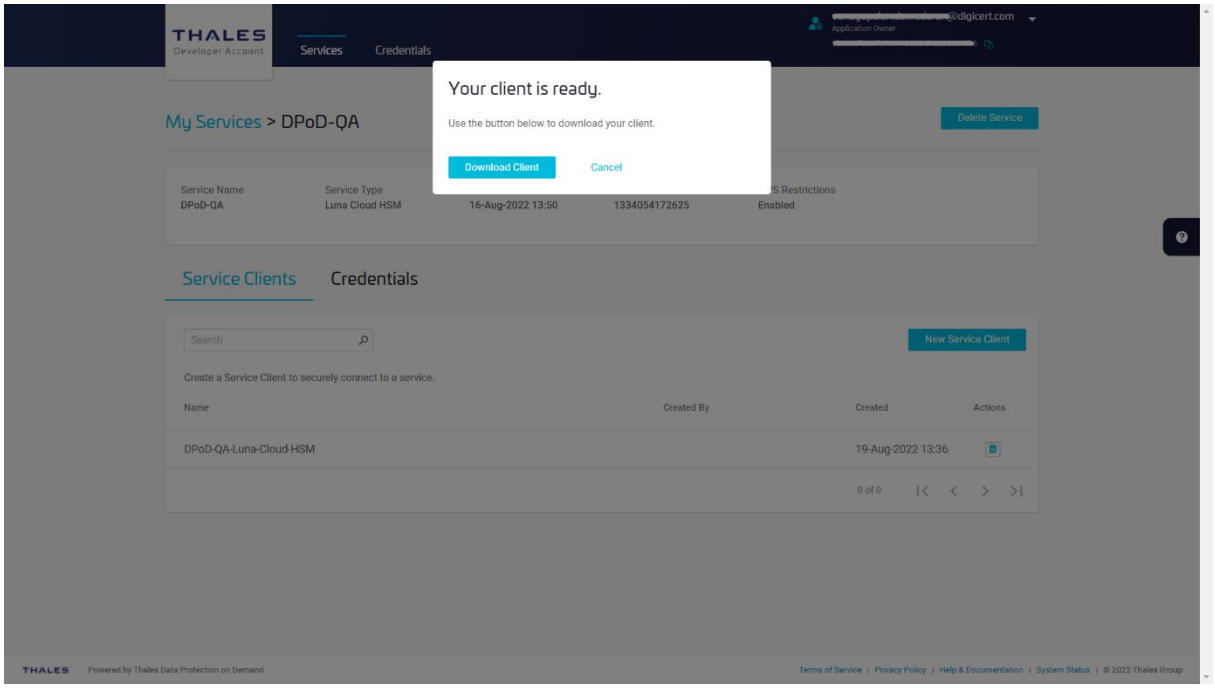


5. It takes several seconds to process.



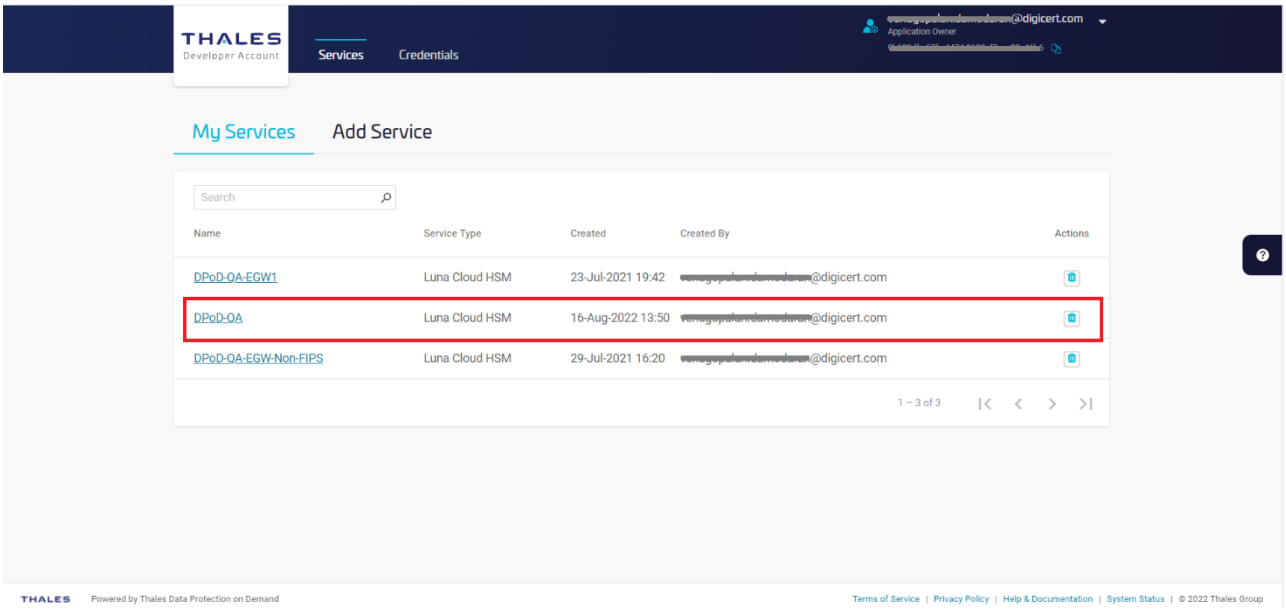
6. Click **Download Client** to download the service client software onto your workstation.

   The name of the archive file will be **setup-<Service Client Name>**.zip. All the tools are included into the file.

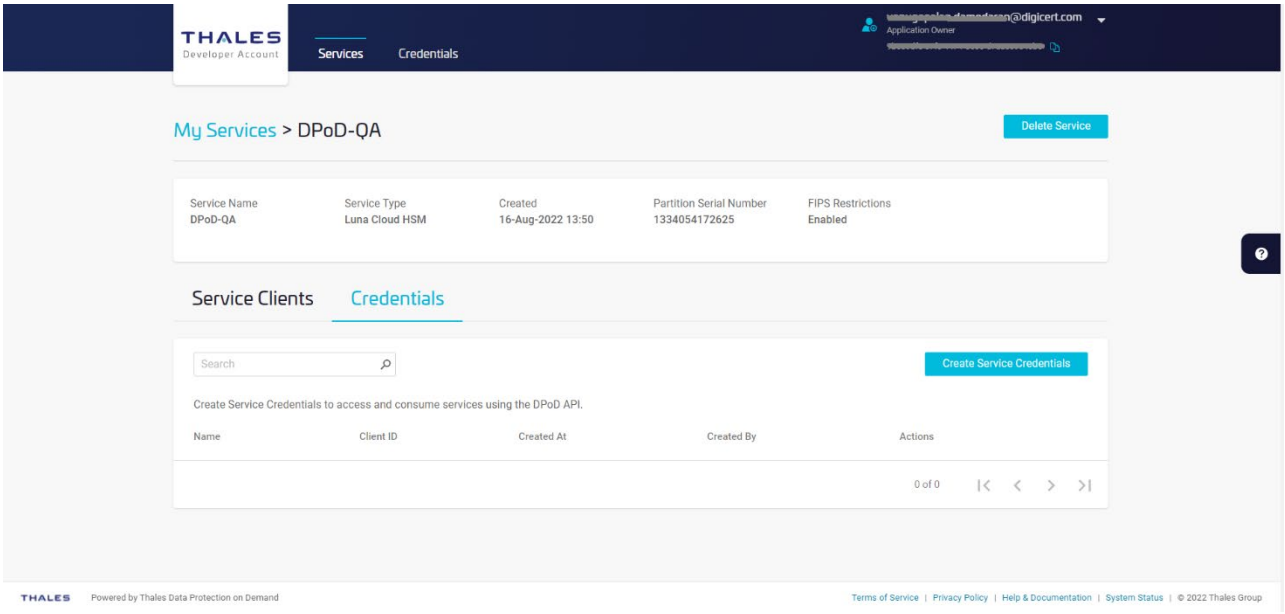


Create Service Credentials as Application Owner

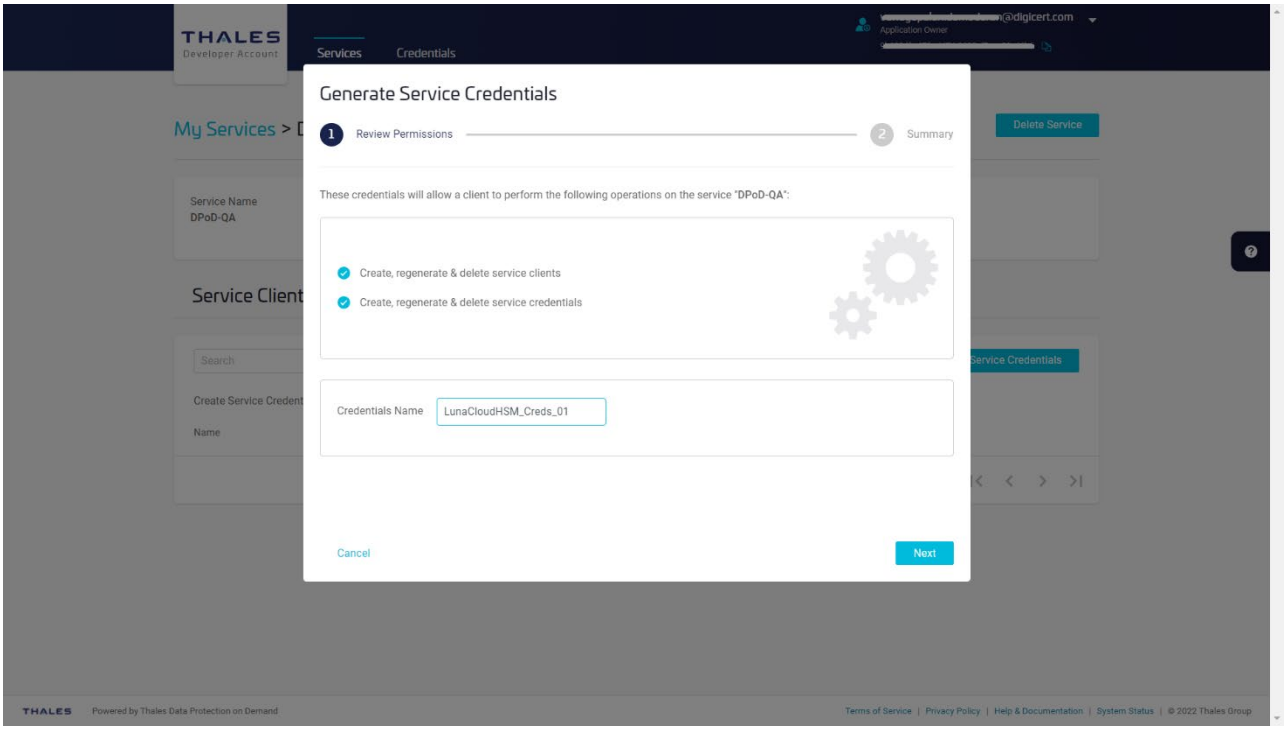
1. Select/Click on the Name under **My Services** (For example: DPPC-QA).



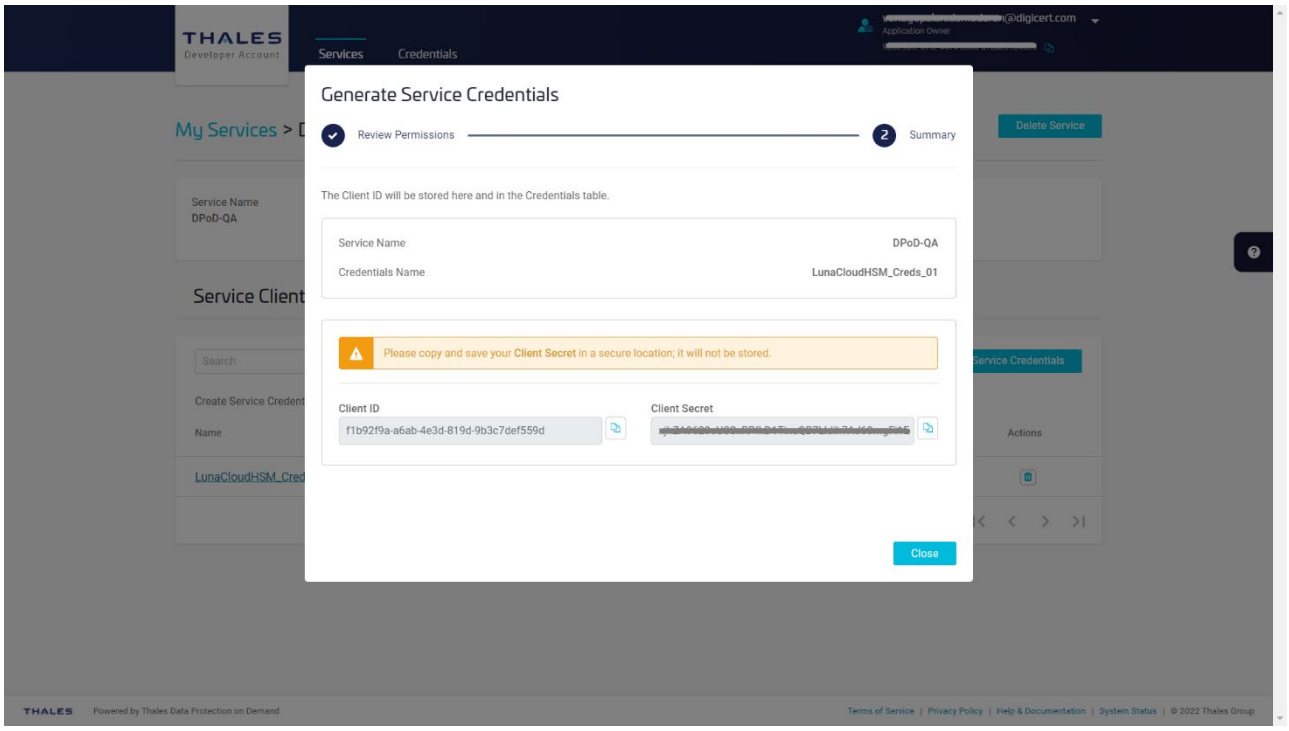
2. Click on **Credentials** and then click on **Create Service Credentials**.



3. Click on **Next**.



4. Click **Close**.



Install Service Client for Windows

The Windows service client installation uses a .zip file to deliver the HSM on Demand (HSMoD) service client materials required for configuring your system's connection to the HSMoD service. The service client .zip includes a pre-configured crystoki-template.ini file along with a client archive file containing a set of library and binary files. Complete the following procedures to access your HSMoD service from a Windows operating system.

1. Extract the downloaded archive file.

   Using the Windows GUI or an unzip tool, unzip the file. The extracted files are as follows:

```
26-09-2022  05:48             1,327 Chrystoki.conf
26-09-2022  05:48             1,129 crystoki-template.ini
26-09-2022  05:48        30,289,920 cvclient-min.tar
26-09-2022  05:48         8,483,712 cvclient-min.zip
26-09-2022  05:48           187,032 EULA.zip
26-09-2022  05:48             8,176 partition-ca-certificate.pem
26-09-2022  05:48             1,387 partition-certificate.pem
26-09-2022  05:48             5,660 server-certificate.pem
```

2. Extract the cvclient-min-zip file.

   Using the Windows GUI or an unzip tool, unzip the file at the same folder. The extracted files are as follows:

```
26-07-2022  21:13    <DIR>          cert
26-07-2022  21:13    <DIR>          csp
26-07-2022  21:13    <DIR>          ksp
26-07-2022  21:13    <DIR>          plugins
```

```
26-07-2022  21:13    <DIR>          WindowsEventProvider
26-09-2022  05:48             1,327 Chrystoki.conf
26-07-2022  21:13           510,184 ckdemo.exe
26-07-2022  21:13         1,844,968 cmu.exe
26-07-2022  21:13         4,267,752 cryptoki.dll
26-09-2022  05:48             1,129 crystoki-template.ini
26-09-2022  05:48        30,289,920 cvclient-min.tar
26-09-2022  05:48         8,483,712 cvclient-min.zip
26-09-2022  05:48           187,032 EULA.zip
26-07-2022  21:13           212,200 LunaAPI.dll
26-07-2022  21:13         3,701,992 lunacm.exe
26-07-2022  21:13           697,965 LunaProvider.jar
26-07-2022  21:13           568,040 multitoken.exe
26-07-2022  21:13             7,145 openssl.cnf
26-09-2022  05:48             8,176 partition-ca-certificate.pem
26-09-2022  05:48             1,387 partition-certificate.pem
26-07-2022  21:13           194,280 SafeNetKSP.dll
26-09-2022  05:48             5,660 server-certificate.pem
26-07-2022  21:13               490 setenv.cmd
26-07-2022  21:13            32,155 setenv.ps1
26-07-2022  21:13         2,166,504 vtl.exe
```

NOTE: Extract the cvclient-min.zip within the directory you created in the previous step. Do not extract to a new cvclient-min.zip directory. This location is required for the setenv command in the next step.

Please remove "crystoki.ini" if it exists before moving to next.

3. Set the environment variable.

   Open "Command Prompt" as Administrator, then move to the directory where the cvclient-min file has been extracted and run the following command:

   ```
   > setenv.cmd
   Generated C:\Users\Test\CloudHSM\setup-DPPC-CloudHSM\crystoki.ini
   ```

   The crystoki.ini is as follows:

   ```
   [Chrystoki2]
   LibNT=C:\Users\Test\CloudHSM\setup-DPPC-CloudHSM\cryptoki.dll
   LibNT32=C:\Users\Test\CloudHSM\setup-DPPC-CloudHSM\cryptoki.dll

   [CardReader]
   RemoteCommand=1
   LunaG5Slots=0

   [Luna]
   DefaultTimeOut=500000
   PEDTimeout1=100000
   PEDTimeout2=200000
   PEDTimeout3=20000
   KeypairGenTimeOut=2700000
   CloningCommandTimeOut=300000
   ```

```
CommandTimeoutPedSet=720000

[Presentation]
ShowEmptySlots=no

[Misc]
PE1746Enabled=1
ToolsDir=C:\Program Files\SafeNet\LunaClient\
PluginModuleDir=C:\Users\Test\CloudHSM\setup-DPPC-CloudHSM\plugins
WindowsEventProvider=C:\Users\Test\CloudHSM\setup-DPPC-
CloudHSM\WindowsEventProvider\LunaClientEventProvider.dll

[XTC]
Enabled=1
TimeoutSec=600

[LunaSA Client]
SSLConfigFile=C:\Users\Test\CloudHSM\setup-DPPC-CloudHSM\openssl.cnf
ReceiveTimeout=20000
TCPKeepAlive=1
NetClient=1
ServerCAFile=C:\Users\Test\CloudHSM\setup-DPPC-
CloudHSM\cert\server\CAFile.pem
ClientCertFile=C:\Users\Test\CloudHSM\setup-DPPC-
CloudHSM\\cert\client\ClientNameCert.pem
ClientPrivKeyFile=C:\Users\Test\CloudHSM\setup-DPPC-
CloudHSM\cert\client\ClientNameKey.pem

[REST]
AuthTokenConfigURI=https://lab-digicert.uaa.system.snakefly.dpsas.io/.well-
known/openid-configuration
AuthTokenClientId=4dd589be-1d9d-43b1-9cf0-faee5f5006c5
AuthTokenClientSecret=XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
RestClient=1
ClientTimeoutSec=120
ClientPoolSize=32
ClientEofRetryCount=15
ClientConnectRetryCount=900
ClientConnectIntervalMs=1000
ServerPort=443
ServerName=na.hsm.dpondemand.io
```

NOTE: At that time, "ChrystokiConfigurationPath" will set on this directory.

The "crystoki.ini" file will be generated.

4. Start LunaCM.

   Start LunaCM. From the directory where you unzipped the cvclient-min.zip file, execute lunacm.exe. If the command executes with no errors, your connection is working correctly.

```
>lunacm.exe
lunacm.exe (64-bit) v10.5.0-470. Copyright (c) 2022 SafeNet. All rights
reserved.


        Available HSMs:

        Slot Id ->              3
        Label ->                DPoD-QA-Luna-Cloud-HSM
        Serial Number ->        1334054172625
        Model ->                Cryptovisor7
        Firmware Version ->     7.3.0
        CV Firmware Version ->  1.5.0
        Plugin Version ->       Cloud 2.2.0-740
        Configuration ->        Luna User Partition With SO (PW) Signing
With Cloning Mode
        Slot Description ->     Net Token Slot
        FM HW Status ->         FM Not Supported


        Current Slot Id: 3
```

NOTE: If you use proxy server, you need to set environment variable of https_proxy as follows;

```
> set https_proxy=http://<proxy-server>/<port>
```

Configure LunaClient

Initialize the partition and users

1. Set the active slot.

   Select the uninitialized application partition.

```
lunacm:> slot set -slot 3
Current Slot Id: 3  (Luna User Slot 7.3.0 (PW) Signing With Cloning Mode)
Command Result : No Error
```

NOTE: You can verify the slot number by executing "slot list" in lunacm.

2. Initialize the application partition.

   Create a partition for the Security Officer (SO), set the initial password, domain name for cloning purposes, and respond to the prompts:

```
lunacm:> partition init -label DPPC-QA
        You are about to initialize the partition.
        Are you sure you wish to continue?
        Type 'proceed' to continue, or 'quit' to quit now -> proceed

        Enter password for Partition SO: ********

        Re-enter password for Partition SO: ********

        Option -domain was not specified.  It is required.

        Enter the domain name: ******

        Re-enter the domain name: ******

Command Result : No Error
```

NOTE: Label: DPPC-QA and Domain: DEVJP

3. Log in as Partition SO.

   Run the following command to login into the partition as the Security Officer (SO) - you can use the shortcut "po".

```
lunacm:> role login -name po
        enter password: ********
Command Result : No Error
```

4. Initialize the Crypto Officer role and set the initial password.

   Run the following command to initialize the Crypto Office (CO) role - you can use the shortcut "co":

```
lunacm:> role init -name co
        enter new password: ********
        re-enter new password: ********
Command Result : No Error
```

5. Log out.

   The Partition SO can create the Crypto Officer, but only the Crypto Officer can create the Crypto User. You must log out to allow the Crypto Officer to login with the newly-set password.

```
lunacm:> role logout
Command Result : No Error
```

NOTE: Once the Crypto Officer logs in and changes the initial credential set by the Partition SO, applications using the CO's challenge secret/password can perform cryptographic operations in the partition. The Crypto Officer can create, modify and delete crypto objects within the partition, and use existing crypto objects (sign/verify). You can also create a limited-capability role called Crypto User that can use the objects created by the Crypto Officer but cannot modify them. The separation of roles is important in some security regimes and operational situations, and where you might be required to satisfy audit criteria for industry or government oversight.

6. Log in as the Crypto Officer.

```
lunacm:> role login -name co
        enter password: ********
Command Result : No Error
```

NOTE: The password for the Crypto Officer role is valid for the initial login only. You must change the initial password using the command role changepw during the initial login session, or a subsequent login. Failing to change the password will result in a CKR_PIN_EXPIRED error when you perform role-dependent actions.

7. If you have not already done so, change the initial password set by the Partition SO.

```
lunacm:> role changepw -name co
        enter existing password: ********
        enter new password: ********
        re-enter new password: ********
Command Result : No Error
```

8. Create the Crypto User.

```
lunacm:> role init -name cu
        enter new password: ********
        re-enter new password: ********
Command Result : No Error
```

   The Crypto User can now log in with the credentials provided by the Crypto Officer and change the initial password. The Crypto User can now use applications to perform cryptographic operations using keys and objects created in the partition by the Crypto Officer.

NOTE: The password for the Crypto User role is valid for the initial login only. The CU must change the initial password using the command role changepw during the initial login session, or a subsequent login. Failing to change the password will result in a CKR_PIN_EXPIRED error when they perform role-dependent actions.

9. Login as Crypt User.

```
lunacm:> role logout
Command Result : No Error
lunacm:> role login -name cu
        enter password: ********
Command Result : No Error
```

10. Change the password for Crypto User.

```
lunacm:> role changepw -name cu
        enter existing password: ********
        enter new password: ********
        re-enter new password: ********
Command Result : No Error
```

NOTE: The initial PIN should be changed.

Configure HA (High Availability)

NOTE: The feature does not support on DPoP Service but there are redundant systems with several LunaPCI on Thales backend. Therefore, it is not required to configure any HA group.

Configure CSP

For SafeNet CSP, the utility register.exe takes care of the registry. To configure CSP, open command prompt as Administrator and run the following commands.

Register CSP Library

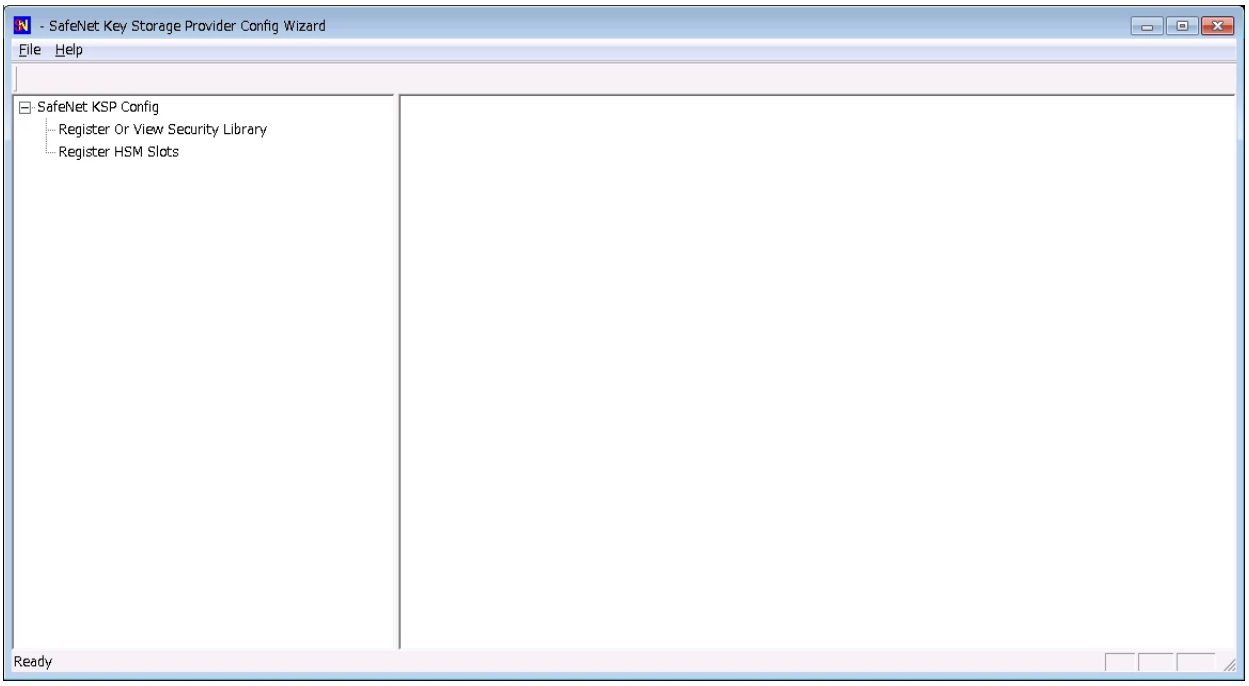
```
C:\Users\Test\CloudHSM\setup-DPPC-CloudHSM\csp>register.exe /library
register.exe (64-bit) v10.5.0-470. Copyright (c) 2022 SafeNet. All rights
reserved.

Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
enhanced RSA and AES provider for Microsoft Windows.
Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
Cryptographic Services for Microsoft Windows.
Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
SChannel Cryptographic Services for Microsoft Windows.
```

Register the partition

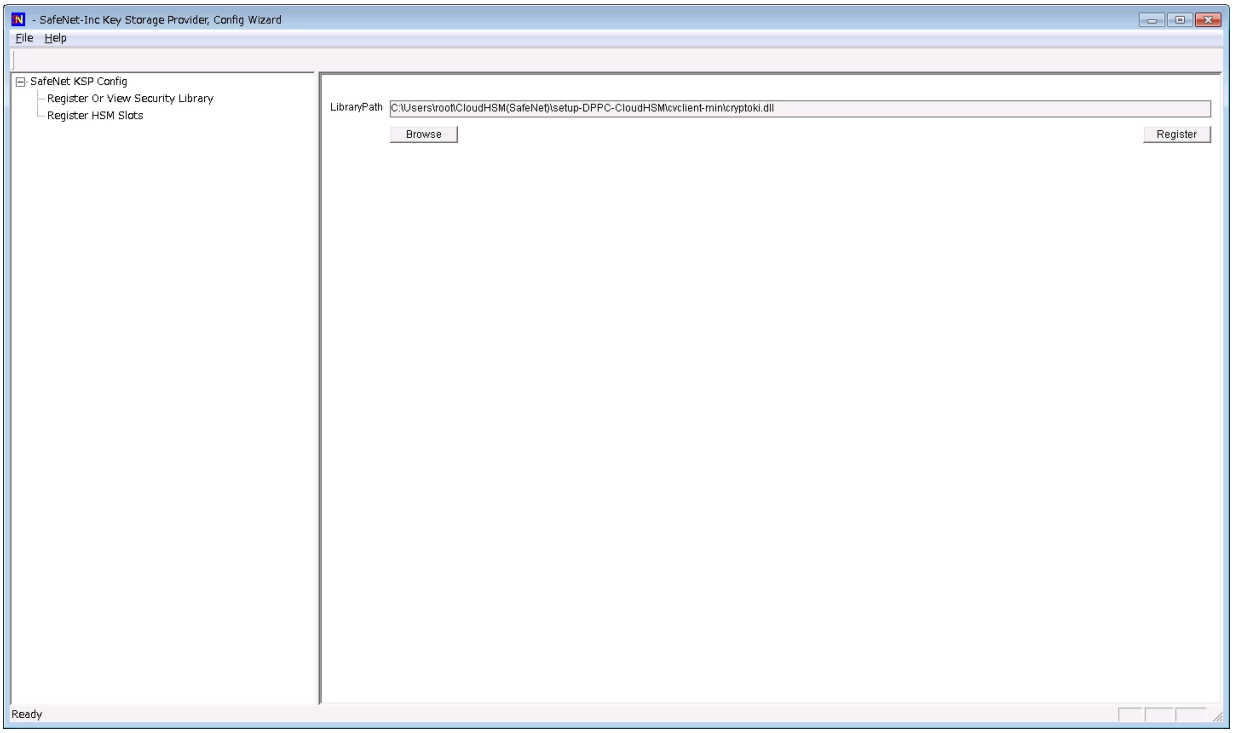
```
C:\Users\Test\CloudHSM\setup-DPPC-CloudHSM\csp>register.exe
register.exe (64-bit) v10.5.0-470. Copyright (c) 2022 SafeNet. All rights
reserved.


 ********************************************************************************
 *                                                                              *
 *       Safenet LunaCSP, Partition Registration                                *
 *                                                                              *
 *       Protect the HSM's challenge for the selected partitions.               *
 *                                                                              *
 *       NOTE:                                                                  *
 *            This is a WEAK protection of the challenge.                       *
 *            After you have configured all applications that will use          *
 *            the LunaCSP and ran them once, you MUST run:                     *
 *                register /partition /strongprotect                            *
 *            to strongly protect the registered challenges.                    *
 *                                                                              *
 ********************************************************************************

This is a destructive procedure and will overwrite any previous
registrations.

Do you wish to continue?: [y/n]y
Do you want to register the partition named '<partition name>'?[y/n]: y
Enter Crypto-Officer challenge for partition '<partition name>' :************

Success registering the encrypted challenge for partition "<partition
name>:3".

Registered 1 partition(s) for use by the LunaCSP.
```

Configure KSP

1. To configure KSP(CNG), run KspConfig.exe. Follow instructions for the use of the graphical KspConfig.exe as described in KSP for CNG in the SDK Reference Guide. The following window will appear:

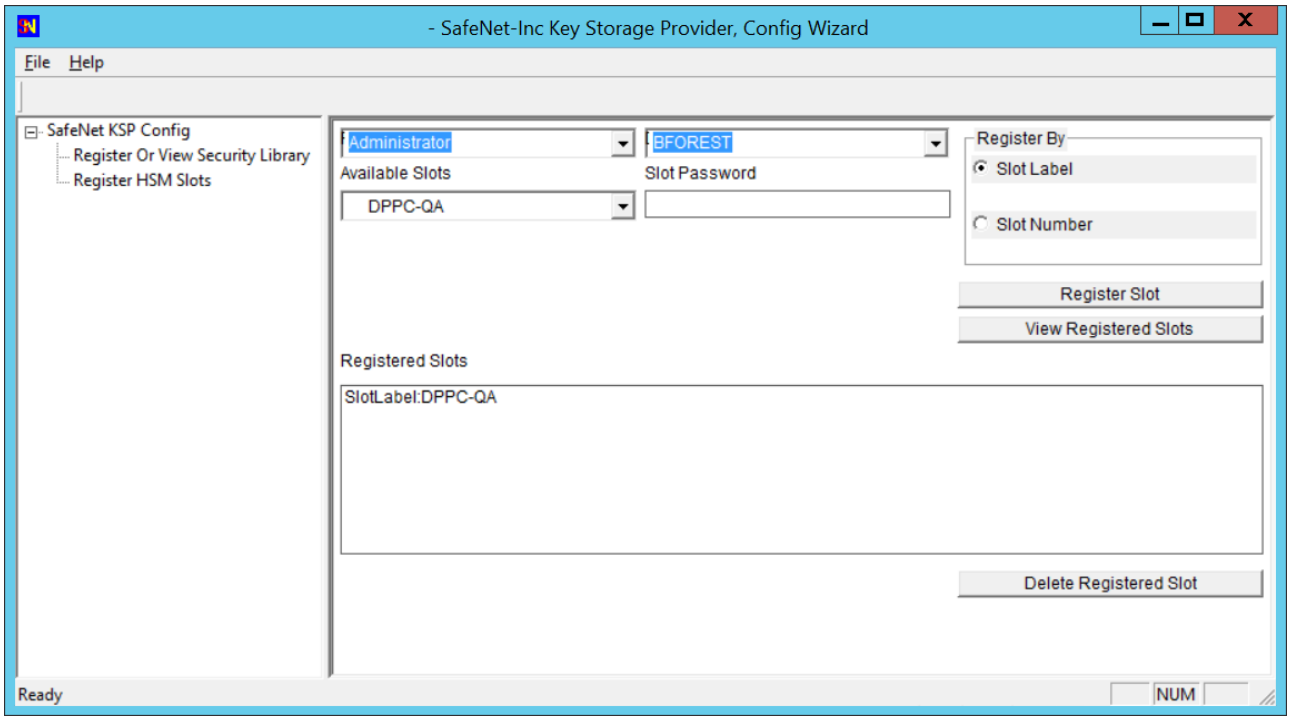


2. Double-click **Register Or View Security Library**, then you can select the value is "<extracted-directory>\cryptoki.dll".



3. Click on "**Register**" button, then you can see the message.

4. Double-click **Register HSM Slots** for Administrator/<Domain Name>
   - Select Administrator
   - Select <Domain Name>
   - Select the Group Name (DPPC-QA) for **Available Slots**
   - Enter Slot Password
5. Click **Register Slot.**



NOTE: When you click "**Register Slot**", there is no change, but this step is necessary.

6. When registering the Luna KSP (with the Luna KSPConfig utility), use the following user and domain combinations:
   - The user and domain performing these procedures.

- The user and domain running the web application and using the private key.
- The local user and NT Authority domain user.
- The LocalSystem and NTAuthority of the system.

NOTE: If you implement the Autoenrollment server, you must also install and register the Luna CSP. Refer to the Luna product documentation for details.

Generate CSR and Install Certificate

1. Create the information file for CSR.

   To generate CSR through certreq.exe via CSP, the ProviderName must be "Luna Cryptographic Services for Microsoft Windows". A sample inf file is shown below:

```
[NewRequest]
KeyUsageProperty = "NCRYPT_ALLOW_ALL_USAGES"
RequestType = PKCS10
ProviderName = "Luna Cryptographic Services for Microsoft Windows"
ProviderType = 1
Subject = "CN=Registration Authority"
KeyContainer = "CSPRA20221001"
MachineKeySet = TRUE
HashAlgorithm = SHA256
KeyAlgorithm = RSA
KeyLength = 2048
```

2. Generate CSR through HSM.

   Open command prompt as Administrator and run the following command. <inf-file> is the file created at Step 1, <csr-file> is an output file.

```
> certreq -new <inf-file> <csr-file>
```

   Then the CSR file will be generated as follows:

```
-----BEGIN NEW CERTIFICATE REQUEST-----
MIIDjzCCAncCAQAwITEfMB0GA1UEAwwWUmVnaXN0cmF0aW9uIEF1dGhvcml0eTCC
....
C610uaqncn6FvLu5pygZYFEVtOanCXNQRRUWiDGWKjHF+10GMh+V5YUur55T4W80
0uwK
-----END NEW CERTIFICATE REQUEST-----
```

NOTE: When the following error message is displayed, SafeNetKSP.dll must be copied to c:\Windows\System32.

```
Certificate Request Processor: The system cannot find the file specified.
0x80070002 (WIN32: 2 ERROR_FILE_NOT_FOUND)
```

3. Get RA Certificate

See "Get a client authentication certificate".

4. Install RA certificate

   Refer section Install RA certificate

Get a client authentication certificate

This section describes steps to get a client authentication certificate using the **Generic User Certificate** template, **CSR** Enrollment Method, and **Enrollment Code** as Authentication Method. But you can get a client authentication certificate using any of the combinations below:

Template	Enrollment Method	Authentication Method
Generic User Certificate	CSR	Manual Approval
Generic User Certificate	REST API	Enrollment Code or 3rd Party app
Generic Device Certificate	CSR	Manual Approval or Enrollment Code
Generic Device Certificate	REST API	Enrollment Code or 3rd Party app

Create profile

1. Sign into DigiCert ONE and navigate to Trust Lifecycle Manager.
2. Select **Manage Profiles** from the left navigation menu, then **Profiles.**
3. Select **Add profile**.
4. Select the **Generic User Certificate** template.

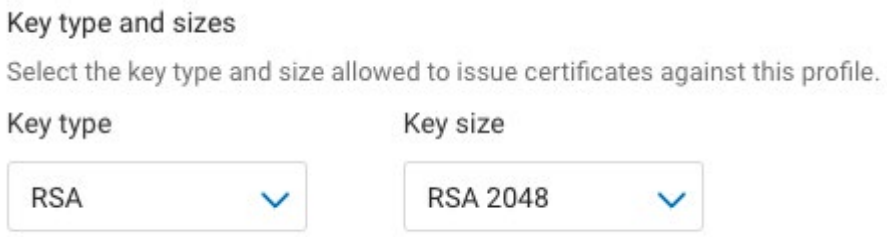
   Note: The appropriate license for the seat type of the template selected must be purchased and available in your account, otherwise that template's link will be disabled.

5. Under the **General information** section, enter the profile **Nickname** and choose the **Business Unit** and **Issuing CA**.
6. From the **Enrollment method** dropdown, select **CSR**.
7. From the **Authentication method** dropdown, select **Enrollment Code.**
8. Select **Next**.
9. Under **Certificate fields**, select the validity period unit (Years, Months, or Days) and enter the value in the textbox.

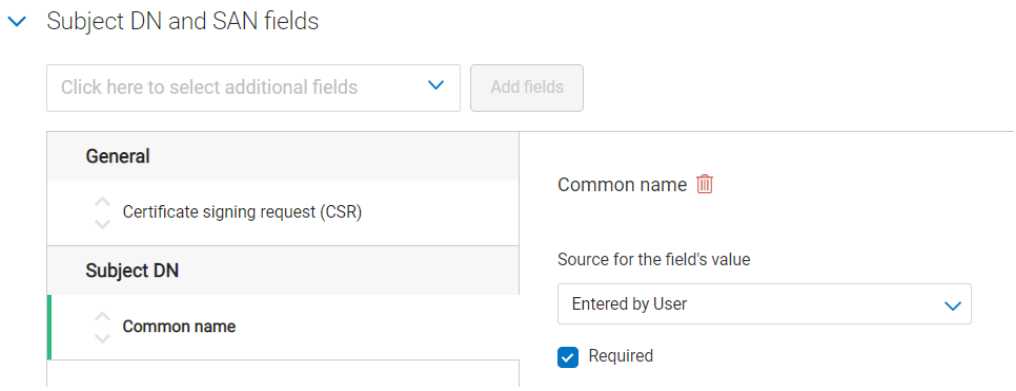
   Note: You cannot issue an end entity certificate with a validity period longer than the remaining validity of the issuing CA. The issuing CA expiration date is shown as a reference in this section.

10. Select the **Algorithm** from the available algorithms in the dropdown list. Available algorithms are based on the issuing CA selected for the profile.

11. Select the **Key type** and attribute from the dropdown lists.



12. Select the checkbox to **Allow duplicate certificates** if multiple certificates are to be issued for the same seat ID.
13. Under Renewal options, select the **Renewal window** from the dropdown list. The default (recommended) value is 30 days.
14. Select **Subject DN** and **SAN** fields from the dropdown list. Select the **Common name** field, then select **Add fields**.



15. For each selected field, from the **Source for the field's value** dropdown, select **Entered by user.**
16. Select **Next.**
17. Specify the **Key usage (KU)** extension criticality and values. **Note:** the KU options shown differ depending on the certificate template being used.
18. Specify the **Extended key usage (EKU)** extension criticality and values. **Note: Client Authentication** is the minimum required EKU value.
19. Select **Next.**
20. Under **Certificate delivery format**, select **PKCS#7 PEM** and **Include CA chain with Root CA** as the certificate delivery format to use and chain certificates to include when certificates are issued.
21. Under **Email configuration & notifications**, specify the template to be used for certificate revocation notification emails.

22. Under **Administrative contact**, specify whether to include default or custom administrative contact details in certificate notification emails. **Note:** including internal support contact details for end users is optional, but recommended.
23. Under **Seat ID Mapping**, select the certificate field to be used as the seat ID. This uniquely identifies each enrollment entity, for licensing purposes.
24. Under **Service User binding**, select the Service user API token to be bound to the certificate profile. If no Service user is selected from the dropdown, then all API tokens in the account will be able to manage this profile.
25. Select **Create**. Your newly created certificate profile is now displayed in the certificate profiles list.

Add User/Device Seat

1. Select **Manage Seats** from the left navigation menu, then **Add user seat.**
2. Enter a **Seat name.**
3. Enter a **Seat ID.**
4. Enter an **Email** (optional).
5. Enter **Phone** details (optional).
6. Select a **Business Unit.**
7. Select **Create user seat.**
8. Select **Enroll Now.**
9. Select the profile created in the Create Profile section from the **Choose A Profile** dropdown.
10. Select **Enroll.**
11. Copy the **Enrollment Code** that is required to get the certificate.
12. Access the link provided in the email.
13. Enter the **Enrollment Code** copied in step 11.
14. Enter the **Certificate signing request (CSR)** that was generated in the Generate CSR section.
15. Enter the **Common name.**
16. Select **Update.**
17. Download the certificate.

Upload client authentication certificate

1. Navigate to **Account Manager.**
2. Select **Access** from the left navigation menu, then **Service User.**
3. Select the Service user for which you are uploading the client authentication certificate.
4. Select **Upload Client authentication certificate** under the **Authentication certificates** section.
5. Enter a **Nickname.**
6. Export the client authentication certificate downloaded under the Add User/Device Seat Section (step 17) in DER or PEM format. Select **Click or drag file to upload** and choose the certificate.
7. Select **Upload client authentication certificate.**

Install RA certificate

1. Open the command prompt (on the folder where the PKCS#7 file is stored) and run the following command:

   ```
   > certreq -accept <issued-cert>
   ```

2. Before running the command above, the trusted root certificate must first be installed. If not, the following error will be displayed:

   ```
   Certificate Request Processor: A certificate chain could not be built to a
   trusted root authority. 0x800b010a (-2146762486 CERT_E_CHAINING)
   ```

Refer to the "**Configure the Autoenrollment Server**" section of the **DigiCert® Autoenrollment Server Deployment Guide** in this KB article for more information.