Connecting to Thredd Guide

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For the latest technical documentation, see the Documentation Portal.

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About this Guide

This guide is intended as a user guide, to provide information on connecting to Thredd services using the Secure Connectivity Framework.

Target audience

This guide is aimed at developers and system integrators who need to set up secure connections to Thredd services. It provides information for security consultants and Chief Information Security Officers (CISOs) who need to assess Thredd's security infrastructure.

What's changed?

If you want to find out what's changed since the previous release, see the Document History section.

Terminology used in this Guide

Note: In this document, any terms in *italics* follow the standard (normative) terminology referenced in the OAuth 2.0 authorisation framework. For more information, see the IETF OAuth 2.0 Authorization Framework.

How to use this Guide

If you are new to Thredd and our security infrastructure, you should refer to the Secure Connectivity Framework and Setup Steps to understand about connecting to Thredd.

For the setup steps you need to perform, refer to the relevant sections:

Other Documentation

Refer to the table below for a list of other relevant documents that should be used together with this guide.

Document	Description
Key Concepts Guide	Provides an introduction to card payments and how describes how Thredd supports your card program.
Web Services Guide (SOAP)	Provides information on the available Thredd web services and fields in each web service.
Cards API	Explains how you can integrate with Thredd's Cards API which uses REST.
EHI Guide	Provides details of the Thredd External Host Interface (EHI).
Thredd Portal Guide	Explains how you can use the Thredd Portal guide for managing cards.
Smart Client Guide	Describes how to use the Thredd Smart Client to manage your account.
Card Transaction System Guide	Describes how to submit card test transactions in the UAT environment.

Tip: For the latest technical documentation, see the Documentation Portal.

Section 1: Getting Started

You should read this section if you are new to the Secure Connectivity Framework and want to understand the basic principles.

Topics covered in this section:

- Secure Connectivity Framework
- Setup Steps

1.1 Secure Connectivity Framework

Thredd's Secure Connectivity Framework is the combination of several components which enable secure access to Thredd's resources, using a common identity store. The main components are:

- Cloudentity
- Thredd CA
- mTLS Termination

Cloudentity

A Software as a Service (SaaS) capability which acts as the *Identity Provider (IDP)* for Thredd's interfaces (including Thredd CA and Thredd Portal) and as an *OAuth OpenID Provider (OP)* for the registration and management of customer applications, generation and validation of access tokens, and for the enforcement of access control policies.

The following figure illustrates Cloudentity and its relationship with other components.

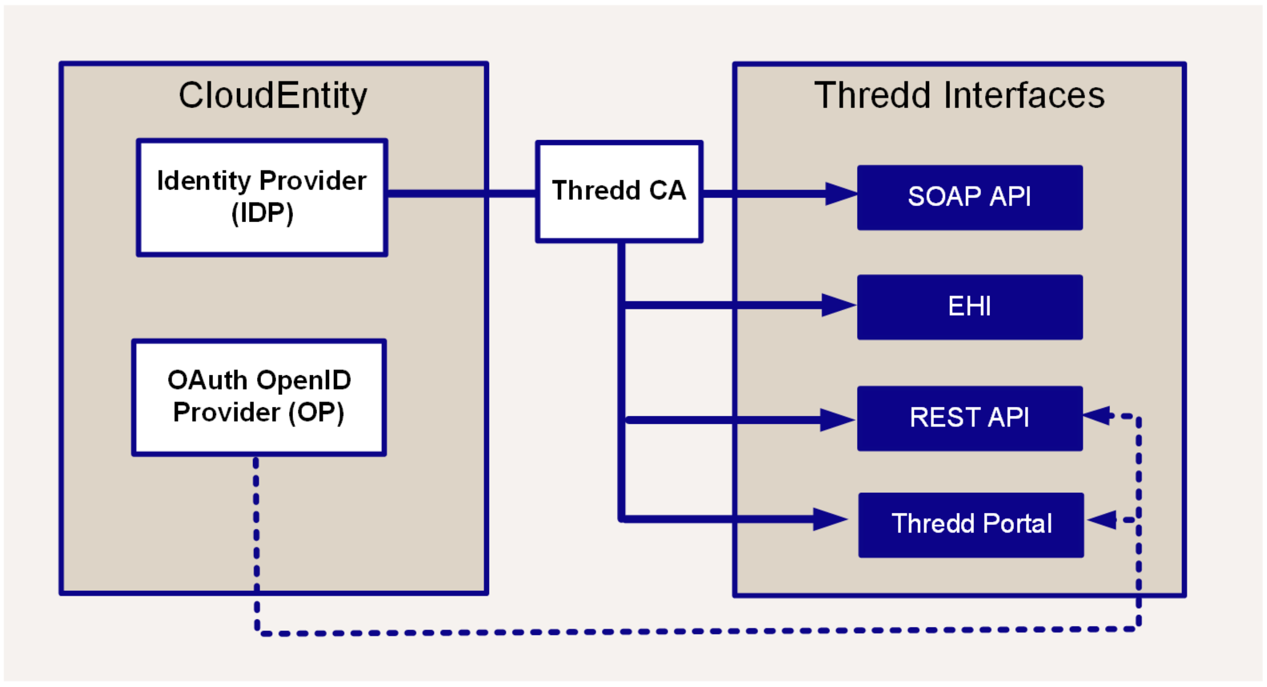


Figure 1: Secure Connectivity Framework Including Cloudentity, Thredd CA, and Various Thredd Services

Thredd CA

Thredd CA is Thredd's Certificate Authority for setting up and managing certificates to connect to various services. The certificates include:

- **Transport Certificates** – for establishing secure connections between resources.
- **Signing Certificates** – for the creation of signed messages, used for authentication of clients, and non-repudiation and authentication of notifications.

The following table shows the certificates that are needed for each Thredd application.

Thredd Application	Transport Certificate	Signing Certificate	Other Certificates	Cloud Entity
REST API	√	√	n/a	x
SOAP API	√	x	n/a	x
External Host Interface (EHI)	x (provided by Thredd)	x	Root and Issuing	x
Thredd Portal	x (pre-installed)	x	n/a	√
Smart Client	x (pre-installed)	x	n/a	x

Additional details

Thredd Application	Certificates Required
REST API	Transport Certificates and Signing Certificates
SOAP	Transport Certificates
External Host Interface (EHI)	Root and Issuing Certificates. These are used to verify Transport Certificates presented by Thredd.
Thredd Portal	Transport Certificates (pre-installed)
Smart Client	Transport Certificates (bundled in the installer)

mTLS Termination

mTLS Termination requires on-premise infrastructure for establishing *Trust Chains*. Trust Chains, which are used to prove that a certificate originates from a legitimate source, are established when clients present Thredd-issued Transport Certificates for connecting to protected resources. This is used exclusively in EHI.

1.2 Setup Steps

This page describes the setup steps for each of the services.

1.2.1 Before you Begin

You need to have been set up on Cloudentity and have obtained access to Thredd Certificate Authority. You can then follow the steps for connecting to individual Thredd services.

Setting Up SSO Using Your Provider

The Secure Connectivity Framework allows you to set up Single Sign-On (SSO) to access various Thredd services that use mTLS, for example Thredd Portal. This not mandatory but is recommended.

SSO allows:

- An enhanced user experience for users as it removes the hassle of remembering passwords.
- Companies to save time on maintenance.
- Reductions in overheads when managing accounts.

For more details, see Configuring SSO.

Set Up Cloudentity

- Thredd sets up Cloudentity for you to enable a Single Sign On journey by linking your IdP with Cloudentity. If you do not use an IdP, Cloudentity can act as the IdP.
- A Single Sign On journey is used to access Thredd Certificate Authority (CA) for the creation of certificates, as well when connecting to the Thredd Portal card management application. In both cases, there is at least one additional Admin user, who manages users. Once set up, your organisation is unlikely to need to engage with Thredd for integrating Cloudentity.
- Cloudentity is also used behind-the-scenes for managing access to the REST API as an *Authorisation Server*.

Set Up Thredd Certificate Authority (CA)

Thredd will provide access to the Thredd CA. Thredd adopts a self-service approach, which allows you to independently manage your certificates.

To request access to Thredd CA, please raise a support ticket.

1.2.2 Steps for Individual Thredd Applications

Secure connections are required to the following Thredd applications:

- SOAP API
- REST API
- External Host Interface (EHI)
- Thredd Portal
- Smart Client

SOAP API

Thredd's SOAP APIs are secured using mTLS. You will need to create Transport Certificates.

For more information, see Creating Client Transport Certificates for SOAP APIs.

REST API

Thredd's REST APIs are secured using mTLS. You should review the following information on how to set up your MTLS connection:

- If you are using Postman to test the Thredd REST APIs for your client application, you can configure Postman to use mTLS. Follow the steps for using Postman as provided on the Cards API Website: Authentication the Cards API with mTLS. You can also view the documentation from the latest Postman collection on the Cards API Website: Using Postman.
- For background details on the Communication Flow between Postman, Thredd Certificate Authority, and Cloudentity, refer to the Communication Flow for Connecting to the REST APIs.
- Before using Postman, you will need to generate Transport Certificates for your client application; see Client Application Certificates for REST APIs. You will also need to generate an obtain an Software Statement Assertion (SSA), which you use to connect to the REST APIs; see Generating and Obtaining a Software Statement Assertion (SSA).
- To help in using the steps in Postman for setting up access to the REST APIs, you should follow the guidance in Using DCR Endpoint Data.
- Postman allows you to generate and obtain SSAs. However, you can generate and obtain SSA using the Thredd CA interface and cURL; see Generating and Obtaining a Software Statement Assertion (SSA).

EHI

Follow the steps below for connecting to EHI:

1. Install Server and Client Certificates.
2. Download Root Certificates and Issuing Certificates. A Root Certificate identifies the Certificate Authority. An Issuing Certificate identifies the system's identity, for example, its public key.
3. Test Client and Server Certificates on your EHI endpoint for mTLS communication.

For more information, see Setting Up EHI with mTLS.

Thredd Portal

You will need to be set up with Cloudentity, enabling authentication using your own Identity Provider (IdP). If you do not use an IdP, Cloudentity can act as the IdP.

For more information, see Connecting to Thredd Portal.

Smart Client and the Card Transaction System (CTS)

- Smart Client Installation: run the Smart Client installer. The installer is bundled with Transport Certificates, which ensure that users in your organisation can connect over mTLS.
- CTS access: CTS can be accessed online. CTS users can use the same credentials as are used to access Smart Client in UAT (provided that CTS has been enabled).

For more information, see Connecting to Smart Client and CTS.

Configuring SSO

Follow these steps for configuring SSO:

- Configuring SSO with Okta (SAML)
- Configuring SSO with Google (SAML)
- Configuring SSO with Okta (OIDC)

Other Services

Other services, including those for Fraud Transaction Monitoring and 3D-Secure, do not require you to set up of secure connections via the Secure Connectivity Framework.

Section 2: SOAP

You should read this section to understand setting up certificates for SOAP web services.

Topics covered in this section:

2.1 Creating Organisation Transport Certificates for SOAP Web Services

This page describes how you create Transport Certificates for accessing Thredd’s SOAP Web Services. As Thredd's SOAP Web Services are secured using Mutual Transport Layer Security (MTLS), your *client application* must present a trusted Transport Certificate for authentication. The steps described on this page for creating a certificate include those through the Thredd CA dashboard, and also via the command line interface.

2.1.1 Summary of Steps

The steps for obtaining a certificate are as follows:

1. Log in to Thredd CA.
2. Prepare the new certificate.
3. Set up the Certificate Signing Request (CSR) for the certificate.
4. Complete creation of the certificate.
5. Convert the certificate and key to the Public Key Cryptography Standard (PKCS#12) Syntax (for Windows only).

A CSR is a file that needs to be submitted to the Certificate Authority (CA) for generating a valid certificate.

Certificate Authority (CA)

A CA is responsible for generating and signing certificates, where Thredd uses its own CA.

Note: The following procedure ensures that you create a Transport Certificate from Thredd CA only. You **must** use certificates from this CA, as self-signed or third-party certificates result in connections being refused.

Storing Generated keys

After generating the private key and CSR on your systems, you must take steps to ensure keys are managed and stored securely.

2.1.2 Prerequisites

The following are prerequisites for creating Transport and Signing Certificates:

- There must be an account on Thredd CA, the application that is required for creating certificates.
- You must have installed OpenSSL on your machine for creating the CSRs.

To access Thredd CA, you must first complete Thredd’s onboarding process. For details, contact your Implementation Manager or Account Manager.

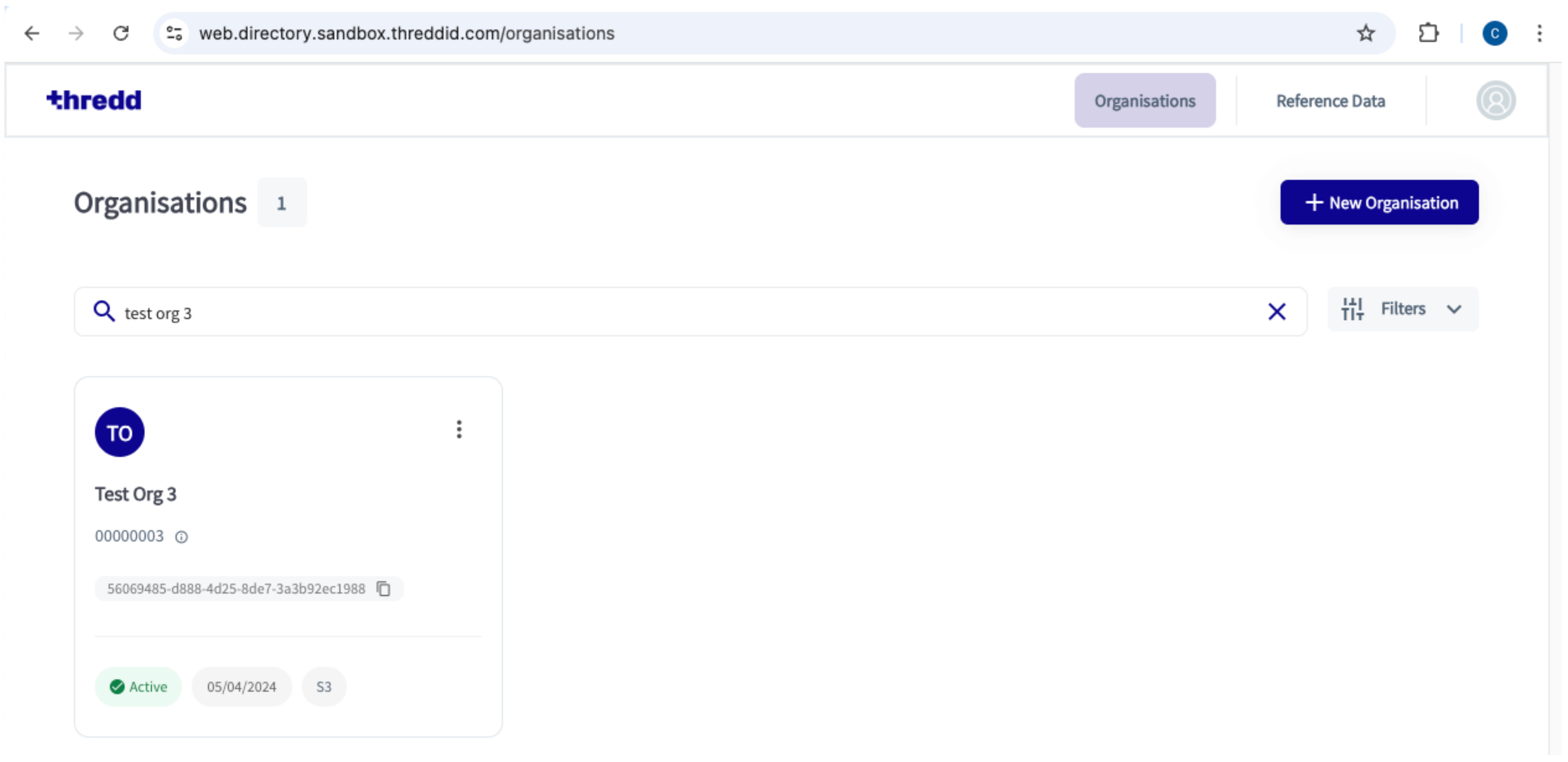
2.1.3 Steps in Setting Up a Certificate

Note that the screenshots below for Private Keys and CSRs contain example data only.

Step 1. Log in to Thredd CA

1. Log in to Thredd CA using these links:
   - Sandbox: https://web.directory.sandbox.threddid.com/
   - Production: https://web.directory.threddid.com/
2. In the Sign-in screen, enter your registered email address and click **Cloudentity SSO**.

3. Follow any other screen prompts or steps provided for your organisation. The Thredd CA dashboard appears with a list of organisations. An organisation appears as a tile as in the following example.

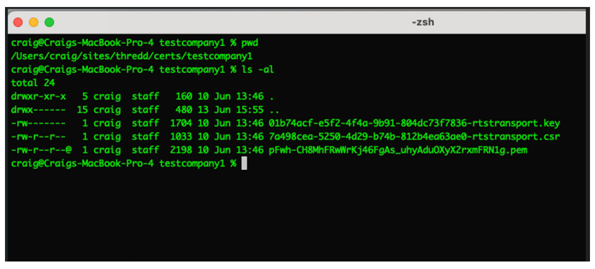


test org 3

TO
Test Org 3
00000003
56069485-d888-4d25-8de7-3a3b92ec1988
Active 05/04/2024 S3

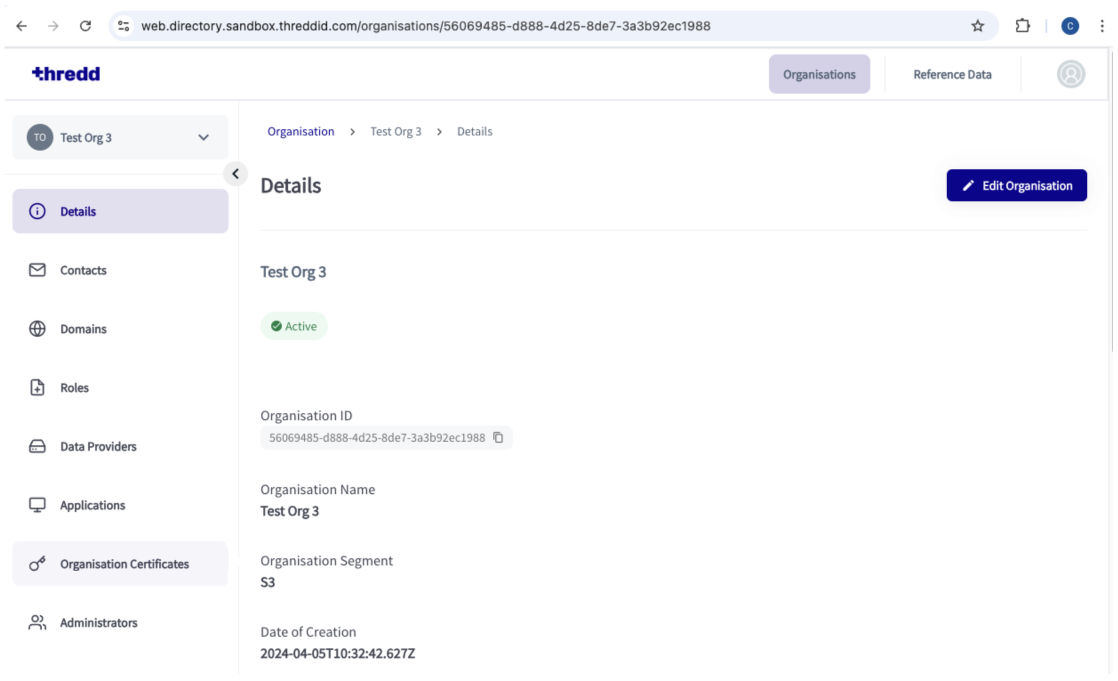
Step 2. Prepare the New Certificate

1. In a new terminal window, create an empty directory for making and receiving the private key and CSR. The following example shows a key pair and CSR that have been created in a directory.



```
-zsh
craig@Craigs-MacBook-Pro-4 testcompany1 % pwd
/Users/craig/sites/thredd/certs/testcompany1
craig@Craigs-MacBook-Pro-4 testcompany1 % ls -al
total 24
drwxr-xr-x   5 craig  staff   160 10 Jun 13:46 .
drwx------  15 craig  staff   480 13 Jun 15:55 ..
-rw-------   1 craig  staff  1704 10 Jun 13:46 01b74acf-e5f2-4f4a-9b91-804dc73f7836-rtstransport.key
-rw-r--r--   1 craig  staff  1033 10 Jun 13:46 7a498cea-5250-4d29-b74b-812b4ea63ae0-rtstransport.csr
-rw-r--r--@  1 craig  staff  2198 10 Jun 13:46 pFwh-CH8MhFRwWrKj46FgAs_uhyAduOXyX2rxmFRN1g.pem
craig@Craigs-MacBook-Pro-4 testcompany1 %
```

2. In the Thredd CA dashboard, click on your organisation's tile.


web.directory.sandbox.threddid.com/organisations/56069485-d888-4d25-8de7-3a3b92ec1988
thredd
Organisations
Reference Data
TO Test Org 3
Details
Contacts
Domains
Roles
Data Providers
Applications
Organisation Certificates
Administrators
Organisation > Test Org 3 > Details
Edit Organisation

Details

Test Org 3

Active

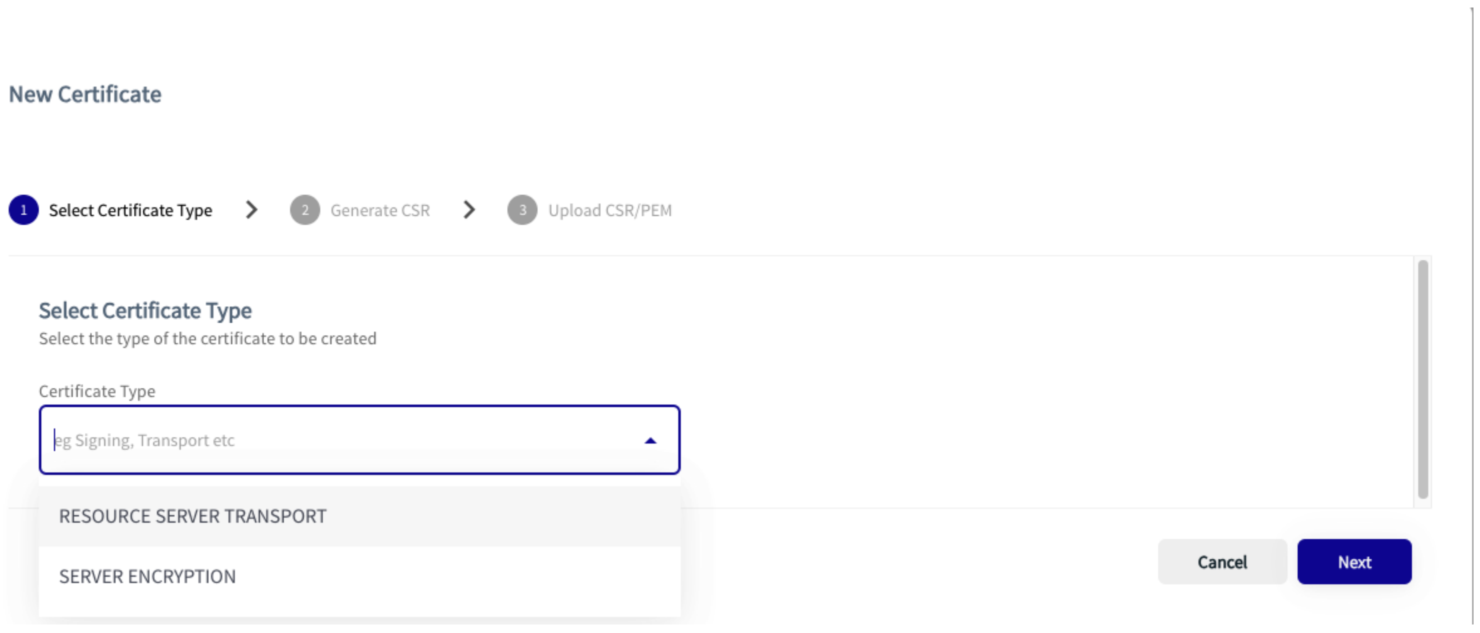
Organisation ID
56069485-d888-4d25-8de7-3a3b92ec1988

Organisation Name
Test Org 3

Organisation Segment
S3

Date of Creation
2024-04-05T10:32:42.627Z

3. In the Thredd CA dashboard, select **Organisation Certificates**.
4. Click **New Certificate**.
5. In the **New Certificate** window, select **RESOURCE SERVER TRANSPORT** in the Select Certificate Type dropdown.



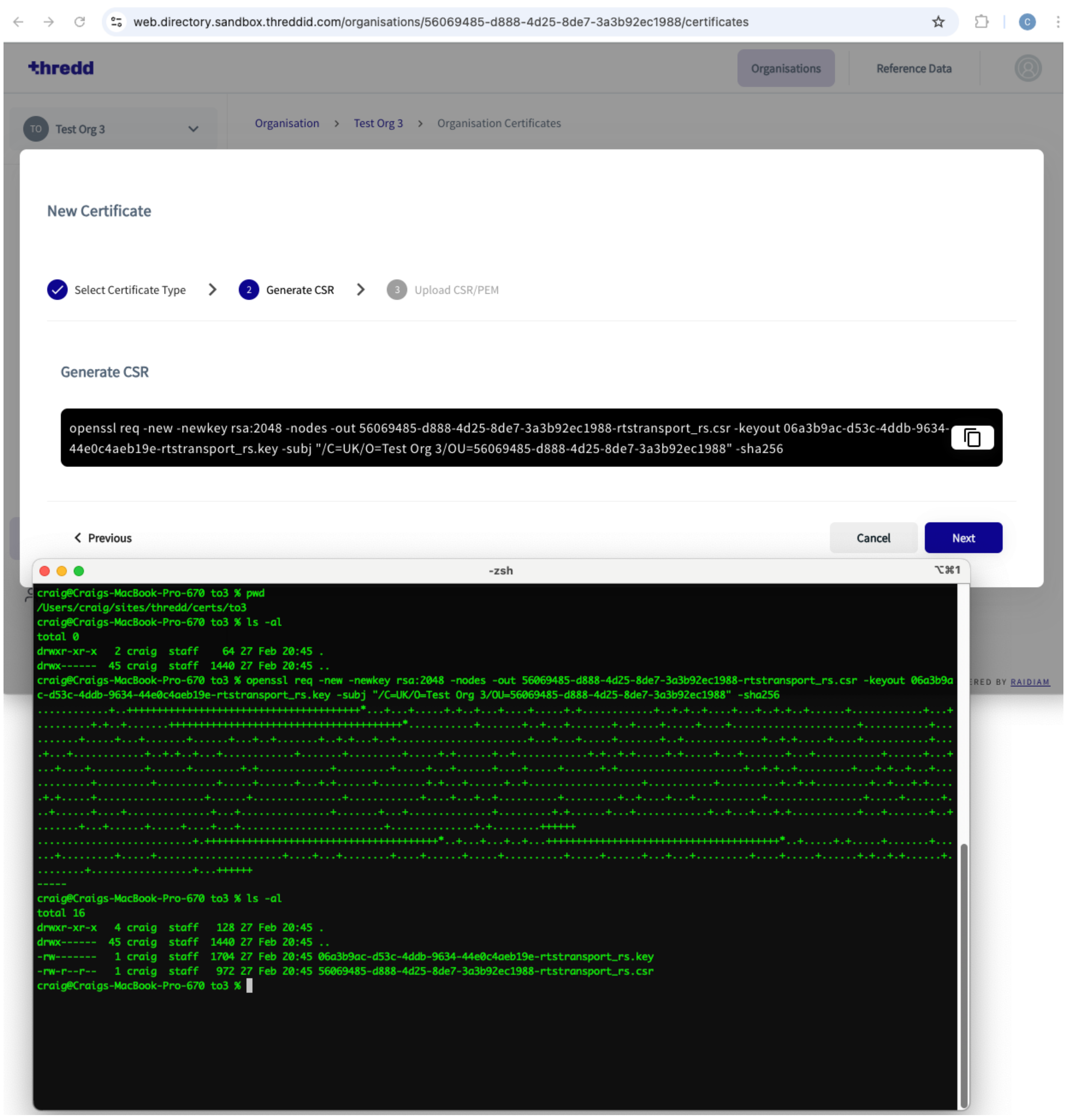
New Certificate
1 Select Certificate Type
2 Generate CSR
3 Upload CSR/PEM
Select Certificate Type
Select the type of the certificate to be created
Certificate Type
eg Signing, Transport etc
RESOURCE SERVER TRANSPORT
SERVER ENCRYPTION
Cancel
Next

Figure 2: New Certificate Dialog box

6. Click **Next**.

Step 3: Set Up the CSR for the Certificate

1. Copy the generated CSR command and paste this into a terminal window.


web.directory.sandbox.threddid.com/organisations/56069485-d888-4d25-8de7-3a3b92ec1988/certificates
thredd
Organisations
Reference Data
TO Test Org 3
Organisation > Test Org 3 > Organisation Certificates
Select Certificate Type
2 Generate CSR
3 Upload CSR/PEM
Previous
Cancel
Next
-zsh
⌥⌘1

New Certificate

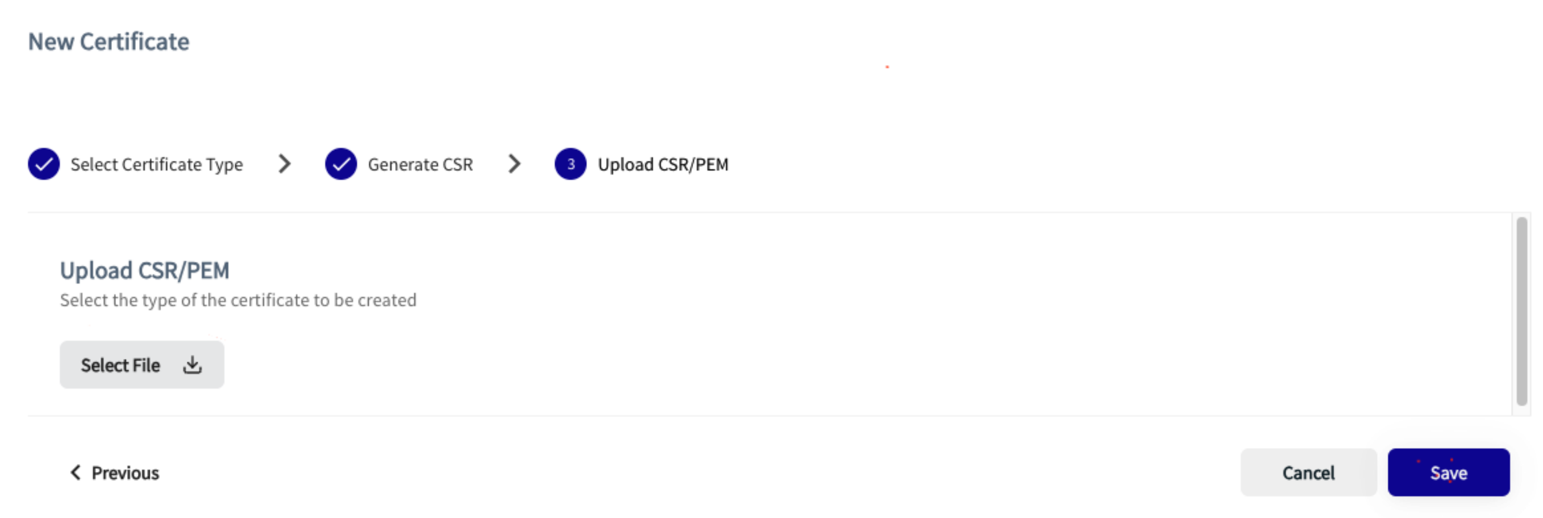
Generate CSR

```
openssl req -new -newkey rsa:2048 -nodes -out 56069485-d888-4d25-8de7-3a3b92ec1988-rtstransport_rs.csr -keyout 06a3b9ac-d53c-4ddb-9634-44e0c4aeb19e-rtstransport_rs.key -subj "/C=UK/O=Test Org 3/OU=56069485-d888-4d25-8de7-3a3b92ec1988" -sha256
```

```
craig@Craigs-MacBook-Pro-670 to3 % pwd
/Users/craig/sites/thredd/certs/to3
craig@Craigs-MacBook-Pro-670 to3 % ls -al
total 0
drwxr-xr-x   2 craig  staff    64 27 Feb 20:45 .
drwx------  45 craig  staff  1440 27 Feb 20:45 ..
craig@Craigs-MacBook-Pro-670 to3 % openssl req -new -newkey rsa:2048 -nodes -out 56069485-d888-4d25-8de7-3a3b92ec1988-rtstransport_rs.csr -keyout 06a3b9a
c-d53c-4ddb-9634-44e0c4aeb19e-rtstransport_rs.key -subj "/C=UK/O=Test Org 3/OU=56069485-d888-4d25-8de7-3a3b92ec1988" -sha256
[illegible]
-----
craig@Craigs-MacBook-Pro-670 to3 % ls -al
total 16
drwxr-xr-x   4 craig  staff   128 27 Feb 20:45 .
drwx------  45 craig  staff  1440 27 Feb 20:45 ..
-rw-------   1 craig  staff  1704 27 Feb 20:45 06a3b9ac-d53c-4ddb-9634-44e0c4aeb19e-rtstransport_rs.key
-rw-r--r--   1 craig  staff   972 27 Feb 20:45 56069485-d888-4d25-8de7-3a3b92ec1988-rtstransport_rs.csr
craig@Craigs-MacBook-Pro-670 to3 %
```

Figure 3: Terminal in the foreground and the New Certificates dialog box in the background

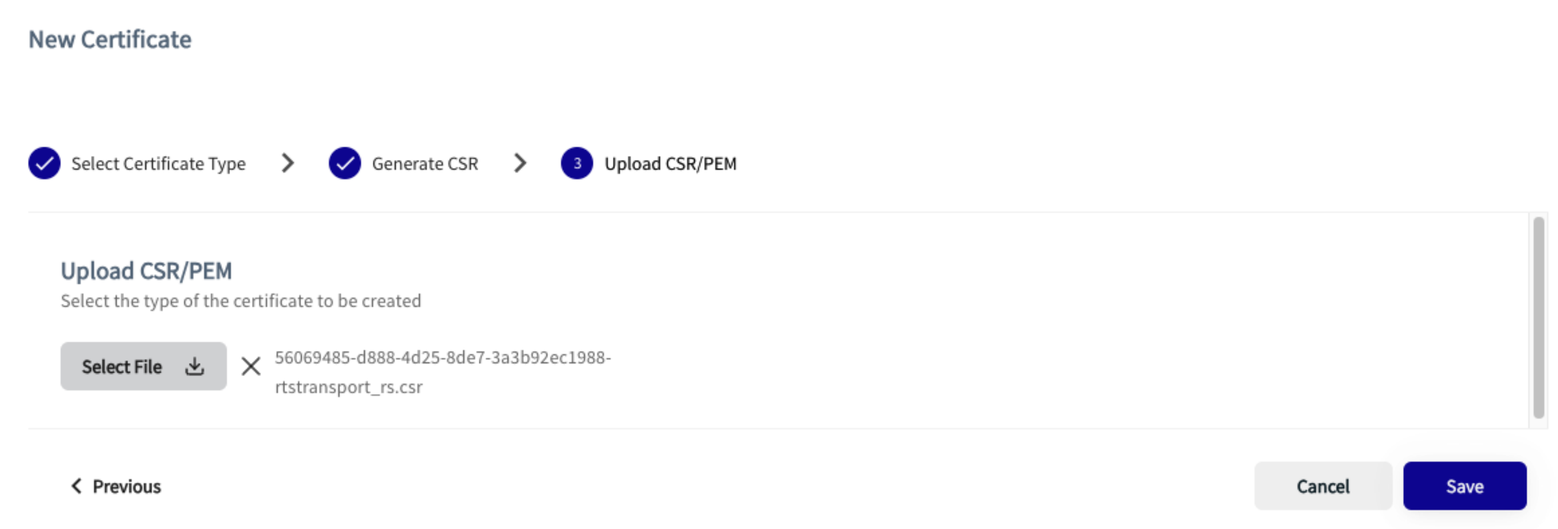
2. Click **Next**.
3. In the terminal window, press Enter to run the OpenSSL command. A Private Key and CSR generates in the background.
4. In Thredd CA, click **Select File**.



5. Browse to the CSR you just created. Then click **Open**.

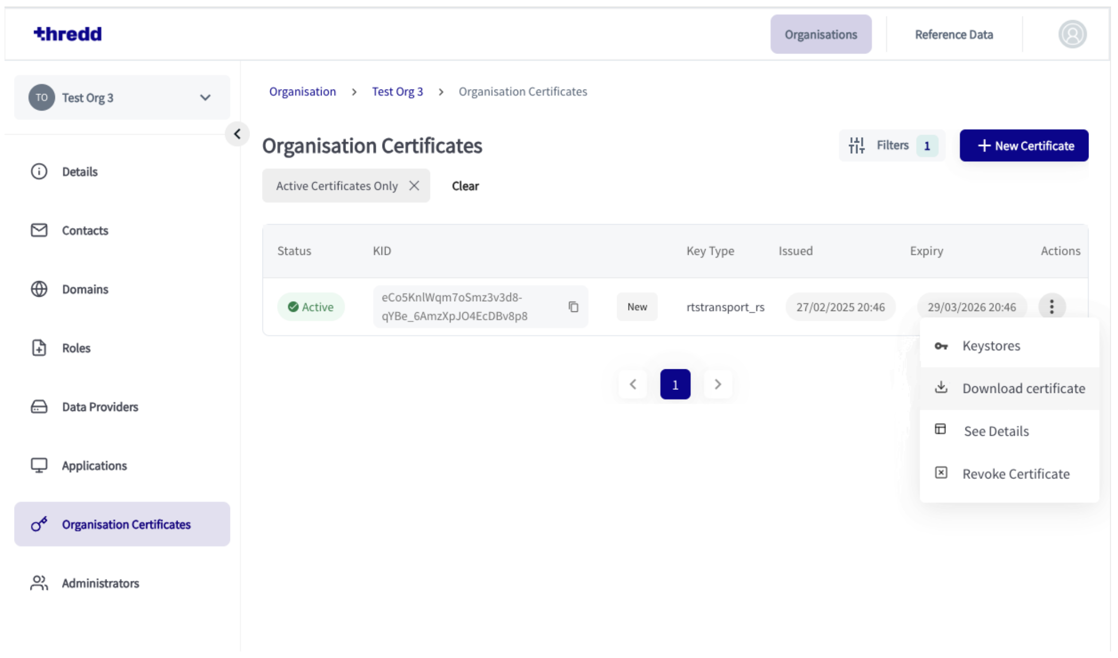
Step 4: Complete the Creation of Certificates

1. In the Thredd CA dashboard, click **Save** for the CSR you selected. This allows you to upload the CSR.



When uploaded, the certificate signing happens. This takes place in a few seconds. The newly created Transport Certificate then appears, and is ready for download.

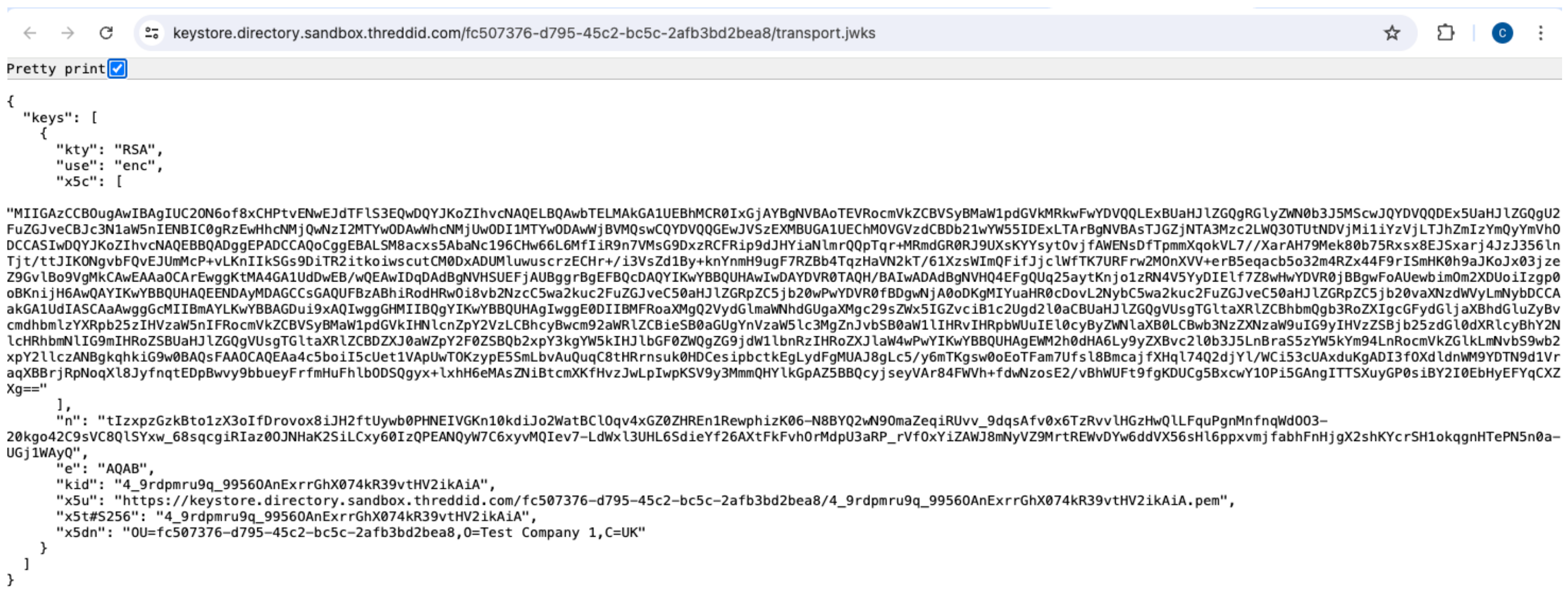
2. On the three dots menu for the generated certificate, select **Download certificate**.



Status	KID		Key Type	Issued	Expiry	Actions
Active	eCo5KnlWqm7oSmz3v3d8-qYBe_6AmzXpJO4EcDBv8p8	New	rtstransport_rs	27/02/2025 20:46	29/03/2026 20:46	⋮

3. Click the download link on the CA UI to download the base 64 encoded X.509 certificate that was just generated.

When you've completed this process, a JSON Web Key Set (JWKS) endpoint is also created with public certificate details. JWKS is a JSON notation for sharing public keys which are used to verify the signature of a signed JSON web token (JWT).


keystore.directory.sandbox.threddid.com/fc507376-d795-45c2-bc5c-2afb3bd2bea8/transport.jwks
Pretty print

```
{
  "keys": [
    {
      "kty": "RSA",
      "use": "enc",
      "x5c": [

"MIIGAzCCBOugAwIBAgIUC2ON6of8xCHPtvENwEJdTFlS3EQwDQYJKoZIhvcNAQELBQAwbTELMAkGA1UEBhMCR0IxGjAYBgNVBAoTEVRocmVkZCBVSyBMaW1pdGVkMRkwFwYDVQQLExBUaHJlZGQgRGlyZWN0b3J5MScwJQYDVQQDEx5UaHJlZGQgU2
FuZGJveCBJc3N1aW5nIENBIC0gRzEwHhcNMjQwNzI2MTYwODAwWhcNMjUwODI1MTYwODAwWjBVMQswCQYDVQQGEwJVSzEXMBUGA1UEChMOVGVzdCBDb21wYW55IDExLTArBgNVBAsTJGZjNTA3Mzc2LWQ3OTUtNDVjMi1iYzVjLTJhZmIzYmQyYmVhO
DCCASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBALSM8acxs5AbaNc196CHw66L6MfIiR9n7VMsG9DxzRCFRip9dJHYiaNlmrQQpTqr+MRmdGR0RJ9UXsKYYsytOvjfAWENsDfTpmmXqokVL7//XarAH79Mek80b75Rxsx8EJSxarj4JzJ356ln
Tjt/ttJIKONgvbFQvEJUmMcP+vLKnIIkSGs9DiTR2itkoiwscutCM0DxADUMluwuscrzECHr+/i3VsZd1By+knYnmH9ugF7RZBb4TqzHaVN2kT/61XzsWImQFifJjclWfTK7URFrw2MOnXVV+erB5eqacb5o32m4RZx44F9rISmHK0h9aJKoJx03jze
Z9GvlBo9VgMkCAwEAAaOCArEwggKtMA4GA1UdDwEB/wQEAwIDqDAdBgNVHSUEFjAUBggrBgEFBQcDAQYIKwYBBQUHAwIwDAYDVR0TAQH/BAIwADAdBgNVHQ4EFgQUq25aytKnjo1zRN4V5YyDIElf7Z8wHwYDVR0jBBgwFoAUewbimOm2XDUoiIzgp0
oBKnijH6AwQAYIKwYBBQUHAQEENDAyMDAGCCsGAQUFBzABhiRodHRwOi8vb2NzcC5wa2kuc2FuZGJveC50aHJlZGRpZC5jb20wPwYDVR0fBDgwNjA0oDKgMIYuaHR0cDovL2NybC5wa2kuc2FuZGJveC50aHJlZGRpZC5jb20vaXNzdWVyLmNybDCCA
akGA1UdIASCAaAwggGcMIIBmAYLKwYBBAGDui9xAQIwggGHMIIBQgYIKwYBBQUHAgIwggE0DIIBMFRoaXMgQ2VydGlmaWNhdGUgaXMgc29sZWx5IGZvciB1c2Ugd2l0aCBUaHJlZGQgVUsgTGltaXRlZCBhbmQgb3RoZXIgcGFydGljaXBhdGluZyBv
cmdhbmlzYXRpb25zIHVzaW5nIFRocmVkZCBVSyBMaW1pdGVkIHNlcnZpY2VzLCBhcyBwcm92aWRlZCBieSB0aGUgYnVzaW5lc3MgZnJvbSB0aW1lIHRvIHRpbWUuIEl0cyByZWNlaXB0LCBwb3NzZXNzaW9uIG9yIHVzZSBjb25zdGl0dXRlcyBhY2N
lcHRhbmNlIG9mIHRoZSBUaHJlZGQgVUsgTGltaXRlZCBDZXJ0aWZpY2F0ZSBQb2xpY3kgYW5kIHJlbGF0ZWQgZG9jdW1lbnRzIHRoZXJlaW4wPwYIKwYBBQUHAgEWM2h0dHA6Ly9yZXBvc2l0b3J5LnBraS5zYW5kYm94LnRocmVkZGlkLmNvbS9wb2
xpY2llczANBgkqhkiG9w0BAQsFAAOCAQEAa4c5boiI5cUet1VApUwTOKzypE5SmLbvAuQuqC8tHRrnsuk0HDCesipbctkEgLydFgMUAJ8gLc5/y6mTKgsw0oEoTFam7Ufsl8BmcajfXHql74Q2djYl/WCi53cUAxduKgADI3fOXdldnWM9YDTN9d1Vr
aqXBBrjRpNoqXl8JyfnqtEDpBwvy9bbueyFrfmHuFhlbODSQgyx+lxhH6eMAsZNiBtcmXKfHvzJwLpIwpKSV9y3MmmQHYlkGpAZ5BBQcyjseyVAr84FWVh+fdwNzosE2/vBhWUFt9fgKDUCg5BxcwY1OPi5GAngITTSXuyGP0siBY2I0EbHyEFYqCXZ
Xg=="
      ],
      "n": "tIzxpzGzkBto1zX3oIfDrovox8iJH2ftUywb0PHNEIVGKn10kdiJo2WatBClOqv4xGZ0ZHREn1RewphizK06-N8BYQ2wN9OmaZeqiRUvv_9dqsAfv0x6TzRvvlHGzHwQlLFquPgnMnfnqWdOO3-
20kgo42C9sVC8QlSYxw_68sqcgiRIaz0OJNHaK2SiLCxy60IzQPEANQyW7C6xyvMQIev7-LdWxl3UHL6SdieYf26AXtFkFvhOrMdpU3aRP_rVfOxYiZAWJ8mNyVZ9MrtREWvDYw6ddVX56sHl6ppxvmjfabhFnHjgX2shKYcrSH1okqgnHTePN5n0a-
UGj1WAyQ",
      "e": "AQAB",
      "kid": "4_9rdpmru9q_9956OAnExrrGhX074kR39vtHV2ikAiA",
      "x5u": "https://keystore.directory.sandbox.threddid.com/fc507376-d795-45c2-bc5c-2afb3bd2bea8/4_9rdpmru9q_9956OAnExrrGhX074kR39vtHV2ikAiA.pem",
      "x5t#S256": "4_9rdpmru9q_9956OAnExrrGhX074kR39vtHV2ikAiA",
      "x5dn": "OU=fc507376-d795-45c2-bc5c-2afb3bd2bea8,O=Test Company 1,C=UK"
    }
  ]
}
```

Figure 4: JWKS Certificate

Step 5: Convert the Certificate and Key to PKCS#12 Syntax

If required, for example you are using Windows services, you can convert the public certificate and private key to the PKCS#12 syntax. For converting, you can use OpenSSL commands. In the PKCS#12 syntax, the files are in the .pfx format. For more details, see RFC 7292: PKCS #12: Personal Information Exchange Syntax v1.1.

Section 3: REST Applications

You should read this section to understand the setup steps for REST applications.

Topics covered in this section:

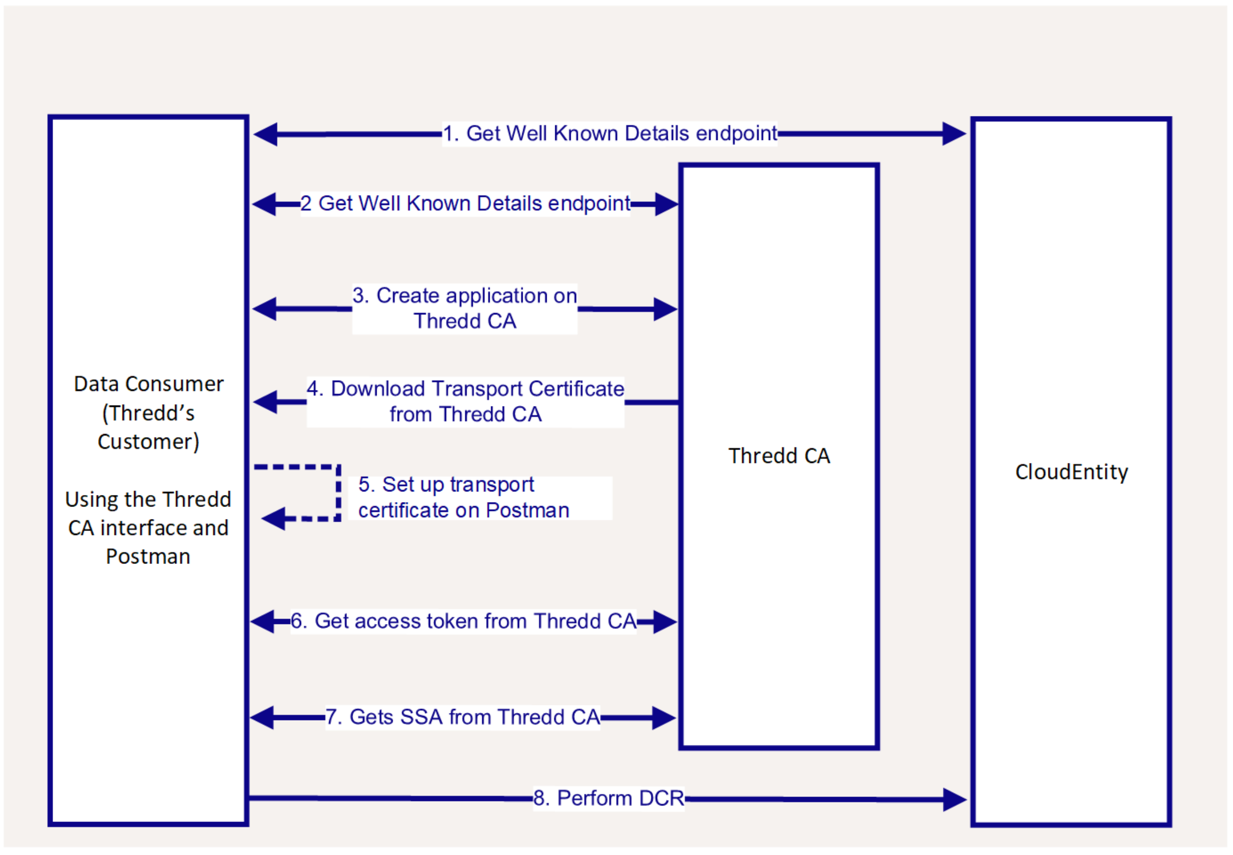
3.1 Communication Flow for Connecting to the REST APIs

This page describes the communication flow for accessing the Thredd REST APIs. There are two main areas in which you will need to set up your connection:

1. **Thredd Certificate Authority (CA) dashboard**. Log in to Thredd CA and create Transport and Signing Certificates. See Creating Client Application Certificates for REST APIs.
2. **A REST tool**. Configure your REST tool interface, for example Postman, to interact with Thredd CA and Cloudentity, so that you can access the API endpoints.

3.1.1 Individual Steps and Details

The following are the steps in the communication flow, where some are performed in Postman while others are done on Thredd Certificate Authority. The Thredd CA interface and Postman are both referred to here as a Data Consumer, where they are a customer of Thredd.



Data Consumer (Thredd's Customer)

Using the Thredd CA interface and Postman
Thredd CA
CloudEntity
1. Get Well Known Details endpoint
2 Get Well Known Details endpoint
3. Create application on Thredd CA
4. Download Transport Certificate from Thredd CA
5. Set up transport certificate on Postman
6. Get access token from Thredd CA
7. Gets SSA from Thredd CA
8. Perform DCR

Figure 5: Individual Steps on Client Interactions with Thredd CA and Cloudentity

1. **Postman:** Gets Well Known endpoint from Cloudentity, which the client later uses to perform Dynamic Client Registration (DCR). A Well Known authorization server metadata endpoint provides a standardised way for clients to discover the necessary information to interact with an OAuth 2.0 or OpenID Connect server. You will need to set up the Get Well Known endpoint in Postman.
2. **Postman:** Gets Well Known Details endpoint which the client later uses to perform Dynamic Client Registration (DCR) from Thredd Certificate Authority. You will need to set this up in Postman.
3. **Thredd Certificate Authority:** Creates an Application on Thredd Certificate Authority.
4. **Thredd Certificate Authority:** Downloads the Transport Certificate from the user interface. You first create the Certificate Signing Request (CSR) and the Private Key, which Thredd CA then uses to generate the Transport Certificate. More details on the steps for generating a certificate are described in Creating OAuth 2.0 Client Application REST Transport Certificates.
5. **Postman:** Sets up a Transport Certificate on Postman that was created in Thredd Certificate Authority. The Transport Certificate is used to connect to the APIs.
6. **Postman:** Gets an access token from Thredd CA(Postman).
7. **Postman and Thredd Certificate Authority:** Get the Software Statement Assertion (SSA) from Thredd Certificate Authority. An SSA is a JSON web token for identity validation that is needed for Dynamic Client Registration. You will need to have created the SSA; see Generating and Obtaining an SSA.
8. **Postman:** Perform Dynamic Client Registration (DCR) by registering the OAuth Client on Cloudentity.

About DCR

DCR is a protocol that allows OAuth 2.0 and OpenID Connect clients (or client applications) to automatically register with an *Authorisation Server*, in this case Cloudentity. This is the final step that is required before accessing the REST APIs. The following RFCs contain the definition of DCR: RFC 7591: OAuth 2.0 Dynamic Client Registration Protocol and the RFC 7592: OAuth 2.0 Dynamic Client Registration Management Protocol.

Using Postman

For detailed steps on accessing the REST APIs through Postman, refer to the Cards API Website: Using Postman.

3.2 Creating Client Application Certificates for REST APIs

This page describes how you create Transport and Signing Certificates. Creating these certificates is an essential step for enabling OAuth 2.0 client applications that connect to Thredd's REST APIs. As Servers are secured using mTLS, your *client application* must present a trusted Transport Certificate when connecting to either the *Authorisation Server* or the *Resource Server* (which hosts the Thredd APIs). The steps described on this page for creating certificates include those through the Thredd CA dashboard, and also via the command line interface.

Summary of Steps

The steps for obtaining a certificate are as follows:

1. Log in to Thredd CA for your organisation. You will have access to at least one Organisation for your parent company.
2. Register a client application with Thredd's CA. This ensures that the CA recognises the client application before generating certificates.
3. Create a new Transport Certificate.

You will need to create a CSR (Certificate Signing Request) and a private key. A CSR is a file that needs to be submitted to the Certificate Authority (CA) for generating a valid certificate. Note that all screenshots for private keys and CSRs on this page show example data only.

Note: You need to create certificates before registering an application with the Authorisation Server. Registering an application with the Authorisation Server is part of Dynamic Client Registration. For details, on Dynamic Client Registration, refer to Dynamic Client Registration.

Certificate Types for the CA

This CA is responsible for generating and signing the following certificate types:

- Transport Certificates – used for client and server authentication.
- Signing Certificates – used for proving identity.

Note: The following procedure ensures that you create a Transport Certificate and Signing Certificate from the Thredd CA only. You **must** use certificates from this CA, as self-signed or third-party certificates result in connections being refused.

Storing Generated keys

After generating the private key and CSR on your system, you must take steps to ensure that the keys are managed and stored securely.

3.2.1 Pre-requisites

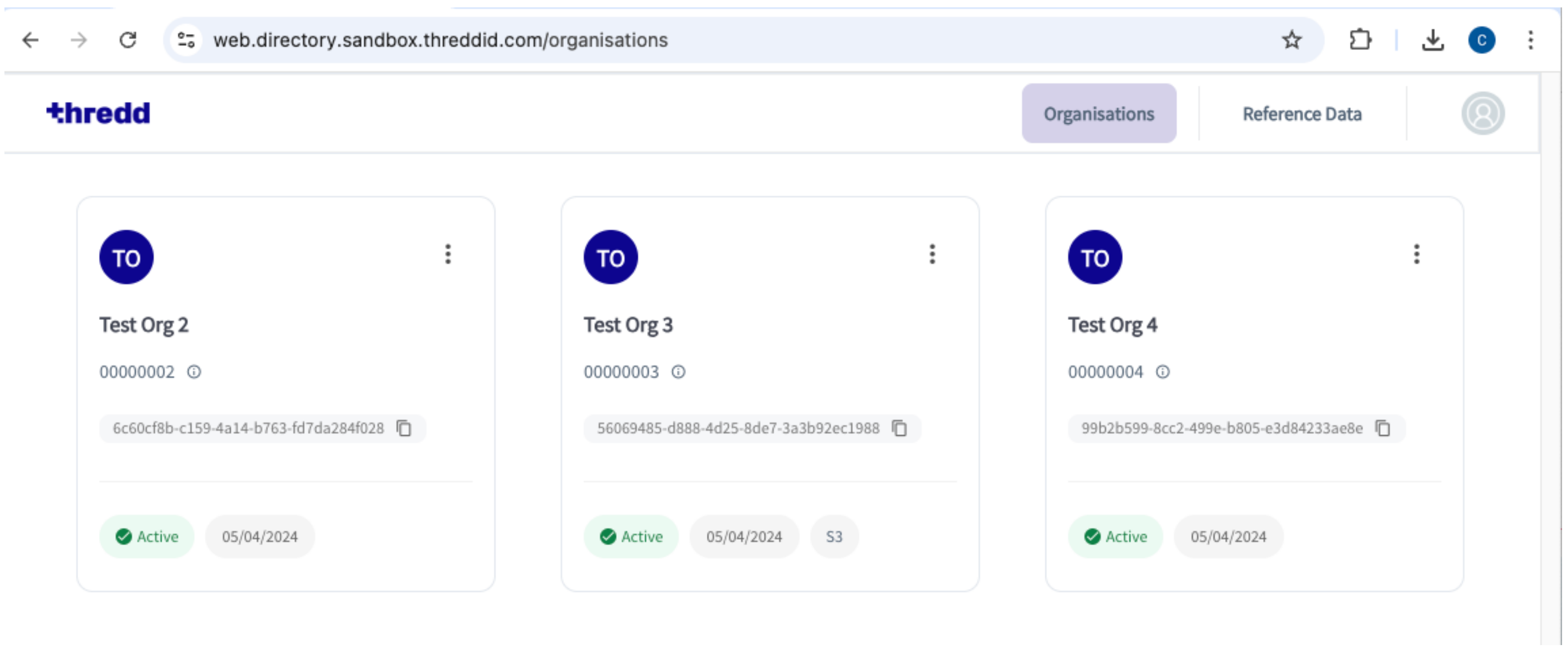
The following are prerequisites for creating Transport and Signing Certificates:

- There must be an account on Thredd CA, the application that is required for creating certificates.
- You must have installed OpenSSL on your machine for creating the CSRs.

To access Thredd CA, you must first complete Thredd’s onboarding process. For details, contact your Implementation Manager.

3.2.2 Step 1. Log In to Thredd CA

1. Log in to Thredd CA using the links below:
   - Sandbox: https://web.directory.sandbox.threddid.com/
   - Production: https://web.directory.threddid.com/
2. In the Sign-in screen, enter your registered email address and click **Cloudentity SSO**.
3. Follow any other screen prompts or steps provided for your organisation. The Thredd CA dashboard appears with a list of organisations.


web.directory.sandbox.threddid.com/organisations

thredd — Organisations | Reference Data

Test Org 2	Test Org 3	Test Org 4
00000002	00000003	00000004
6c60cf8b-c159-4a14-b763-fd7da284f028	56069485-d888-4d25-8de7-3a3b92ec1988	99b2b599-8cc2-499e-b805-e3d84233ae8e
Active 05/04/2024	Active 05/04/2024 S3	Active 05/04/2024

3.2.3 Step 2. Register a Client Application

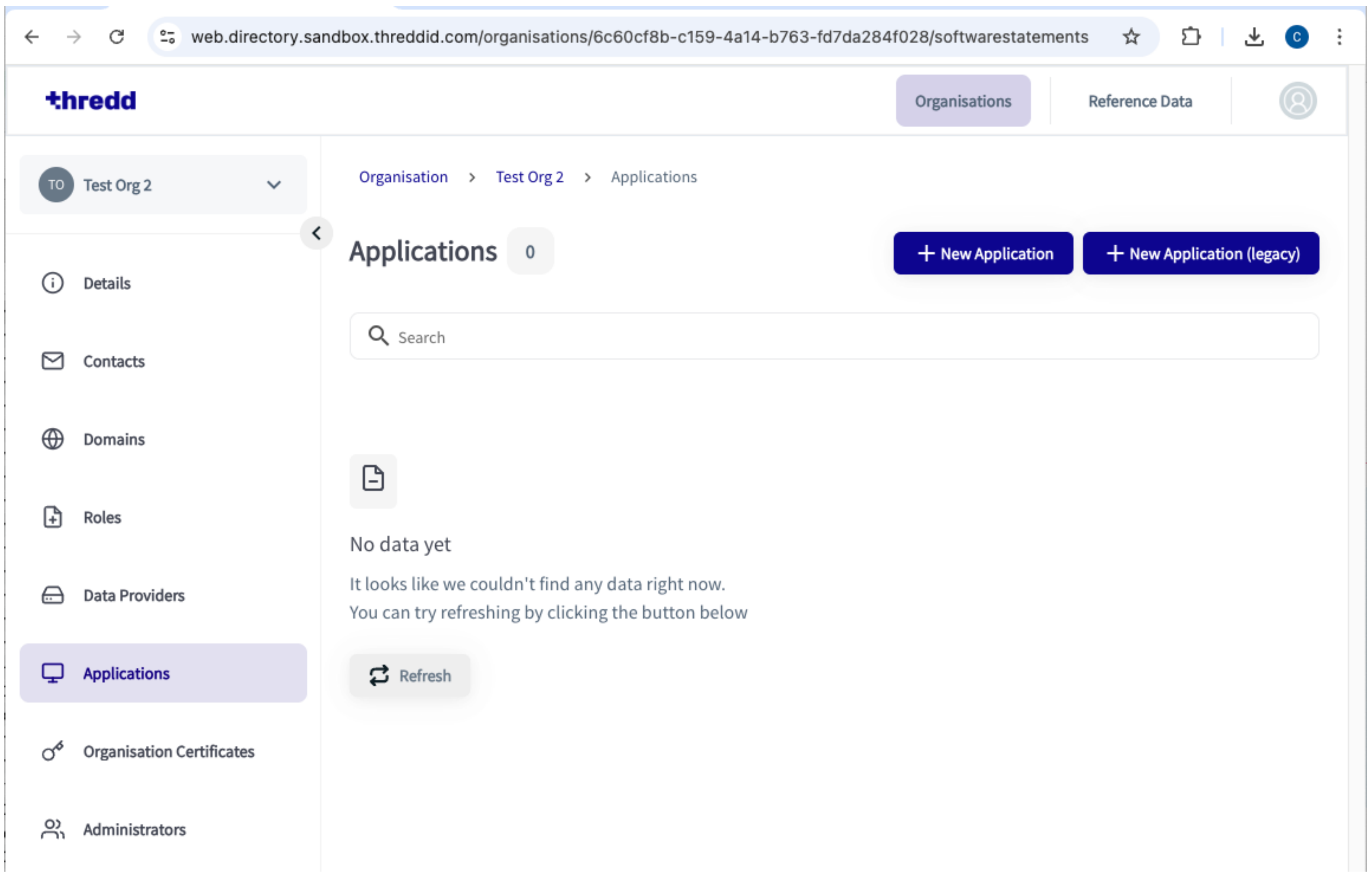
Before creating either a Transport Certificate or a Signing Certificate, you must register a *client application* with Thredd's CA. Using Thredd CA, you provide metadata associated with the application. The steps for registration are as follows:

1. Create the new client application.
2. Select roles associated with your client application.
3. Enter client details, which is any metadata associated with the client.
4. Enter user authentication settings.
5. Type in additional details

Note: The step for registering a client application **does not** register the application with the *Authorisation Server*. For information on how to register with an *Authorisation Server*, see Dynamic Client Registration.

Create a New Client Application

1. Select your organisation and then select **Applications** from the left-hand menu.


web.directory.sandbox.threddid.com/organisations/6c60cf8b-c159-4a14-b763-fd7da284f028/softwarestatements

No data yet

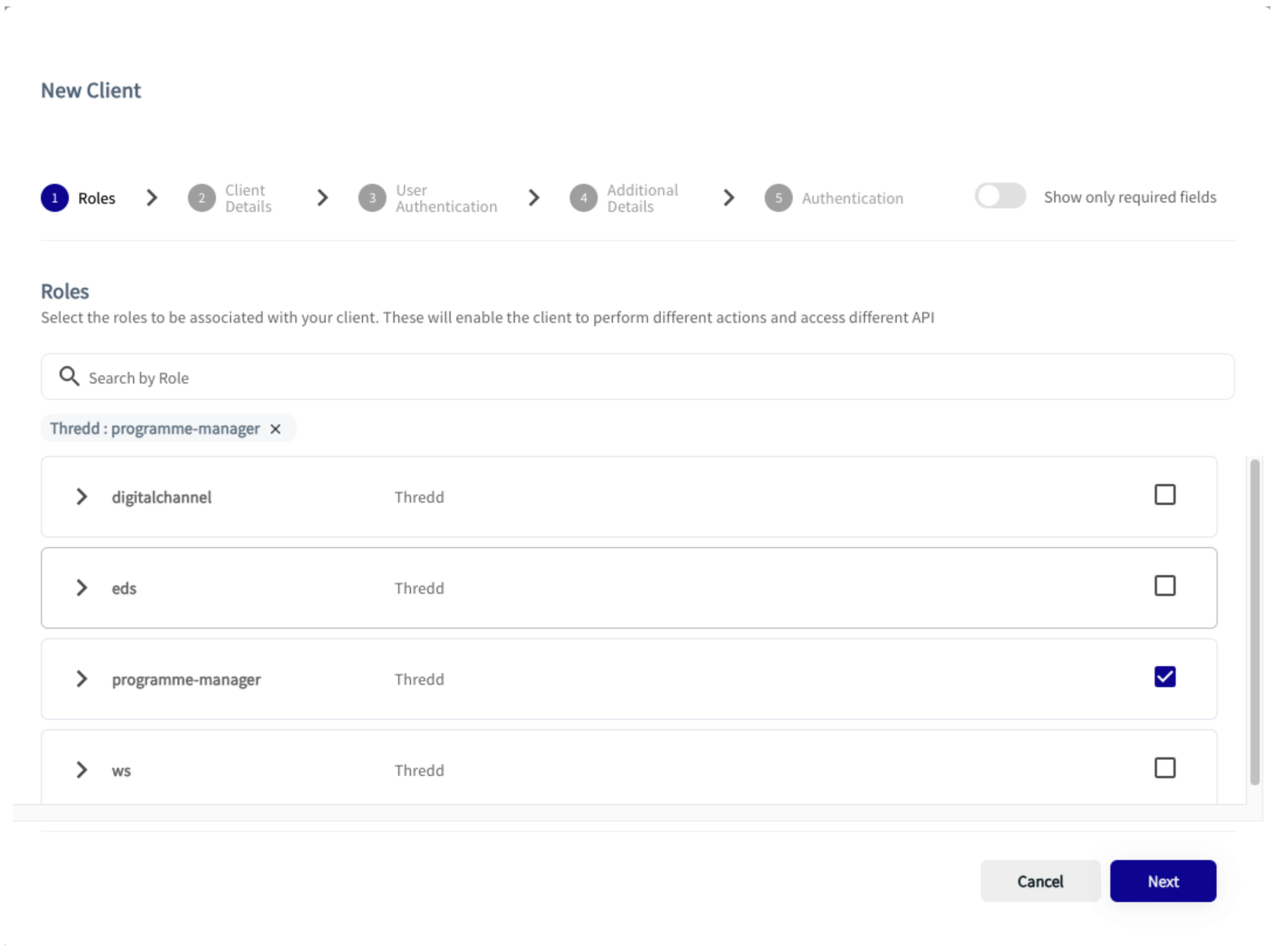
It looks like we couldn't find any data right now.
You can try refreshing by clicking the button below

2. Click **New Application** (top-right of the screen). The **New Client** wizard appears.

Select Roles

The **New Client** shows the roles that are available to you. The organisation determines the available roles.

1. Tick a check box for the role you require. This example shows the selection of the **programme-manager** role.


New Client

1 Roles > 2 Client Details > 3 User Authentication > 4 Additional Details > 5 Authentication — Show only required fields

Roles
Select the roles to be associated with your client. These will enable the client to perform different actions and access different API

Search by Role

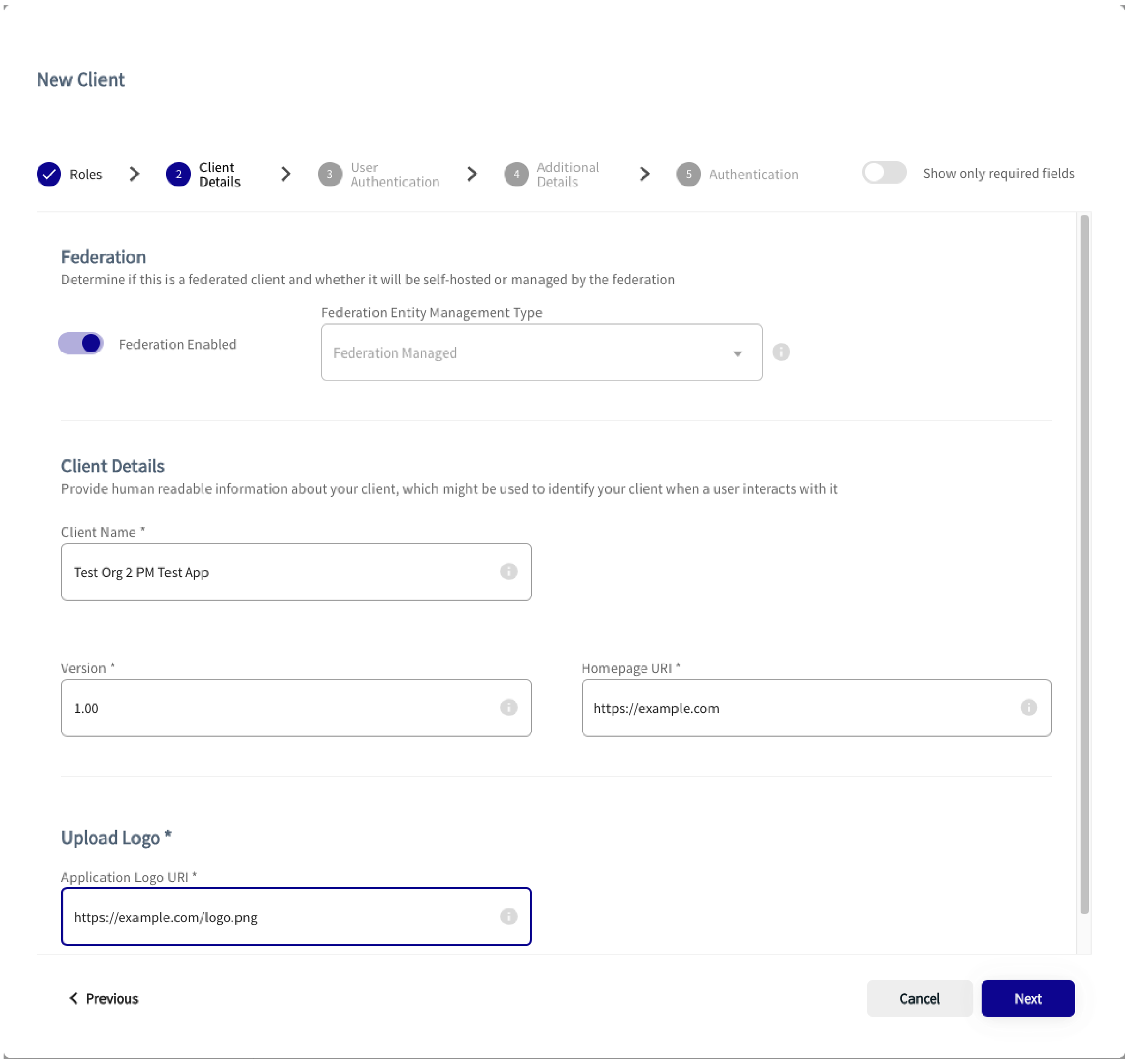
Thredd : programme-manager ✕

digitalchannel	Thredd	☐
eds	Thredd	☐
programme-manager	Thredd	✓
ws	Thredd	☐

2. Click **Next**.

Enter Client Details

1. Complete the form by entering details where applicable. The table below describes the fields.


New Client

Roles > 2 Client Details > 3 User Authentication > 4 Additional Details > 5 Authentication

Show only required fields

Federation

Determine if this is a federated client and whether it will be self-hosted or managed by the federation

Federation Enabled

Federation Entity Management Type: Federation Managed

Client Details

Provide human readable information about your client, which might be used to identify your client when a user interacts with it

Client Name *: Test Org 2 PM Test App

Version *: 1.00

Homepage URI *: https://example.com

Upload Logo *

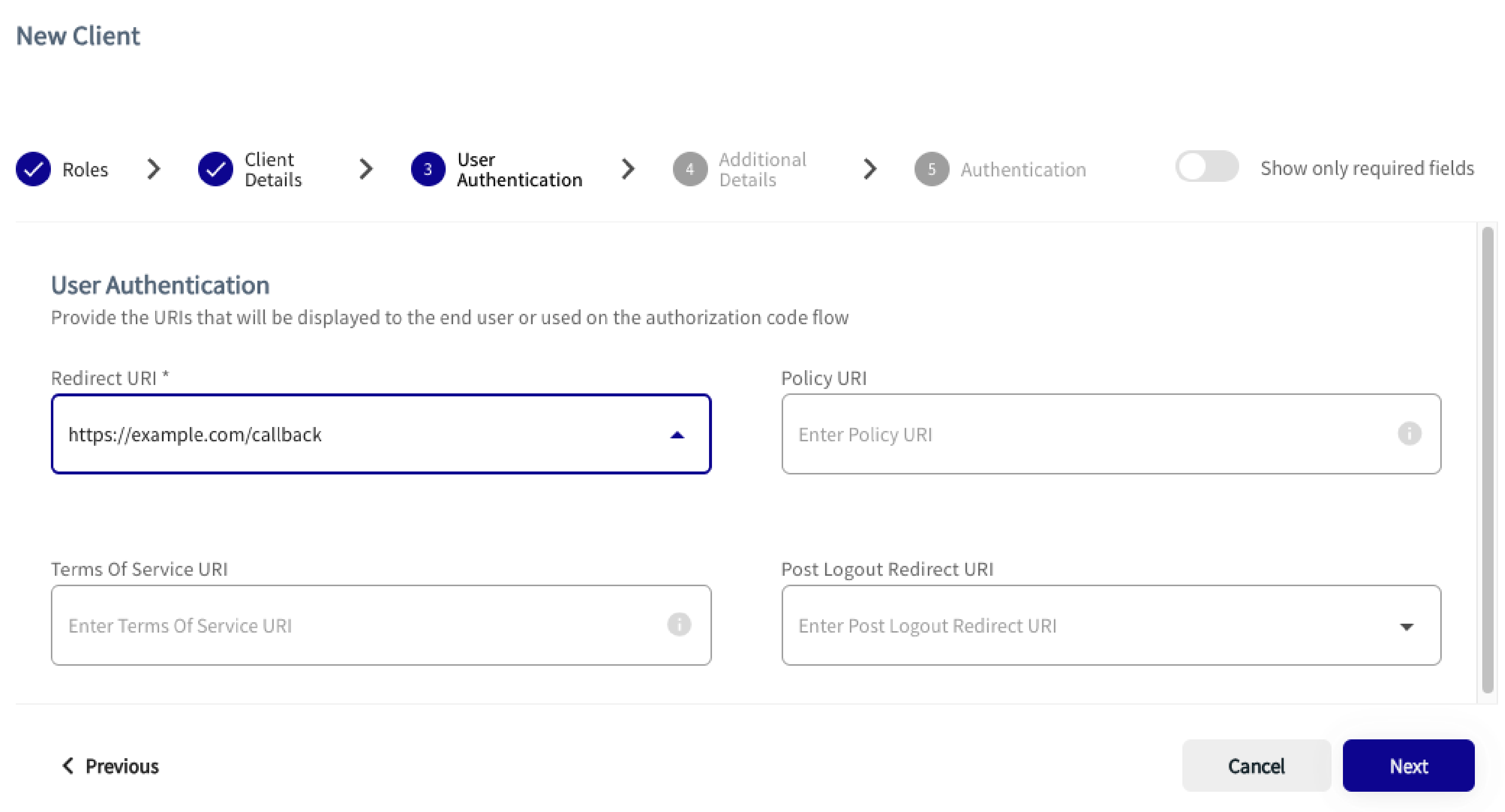
Application Logo URI *: https://example.com/logo.png

Field Name	Example Data	Notes
Federation Configuration	Federation Enabled	It is good practice to have federation enabled for all applications.
Client Name	Test Company App 1	The name of the intended OAuth client application. This setting is mandatory.
Version	1.0	Your chosen application version. This setting is mandatory.
Homepage URI	https://example.com	URI of the homepage. This setting is mandatory.
Upload Logo	https://example.com/logo.png	URI of the logo for the homepage. This must also include the file format of the logo. This setting is mandatory.

2. Click **Next**.

Enter User Authentication Settings

1. Complete the form by entering user authentication details where applicable. The following table describes the relevant fields.


New Client

Roles > Client Details > 3 User Authentication > 4 Additional Details > 5 Authentication   Show only required fields

User Authentication

Provide the URIs that will be displayed to the end user or used on the authorization code flow

Redirect URI *: https://example.com/callback

Policy URI: Enter Policy URI

Terms Of Service URI: Enter Terms Of Service URI

Post Logout Redirect URI: Enter Post Logout Redirect URI

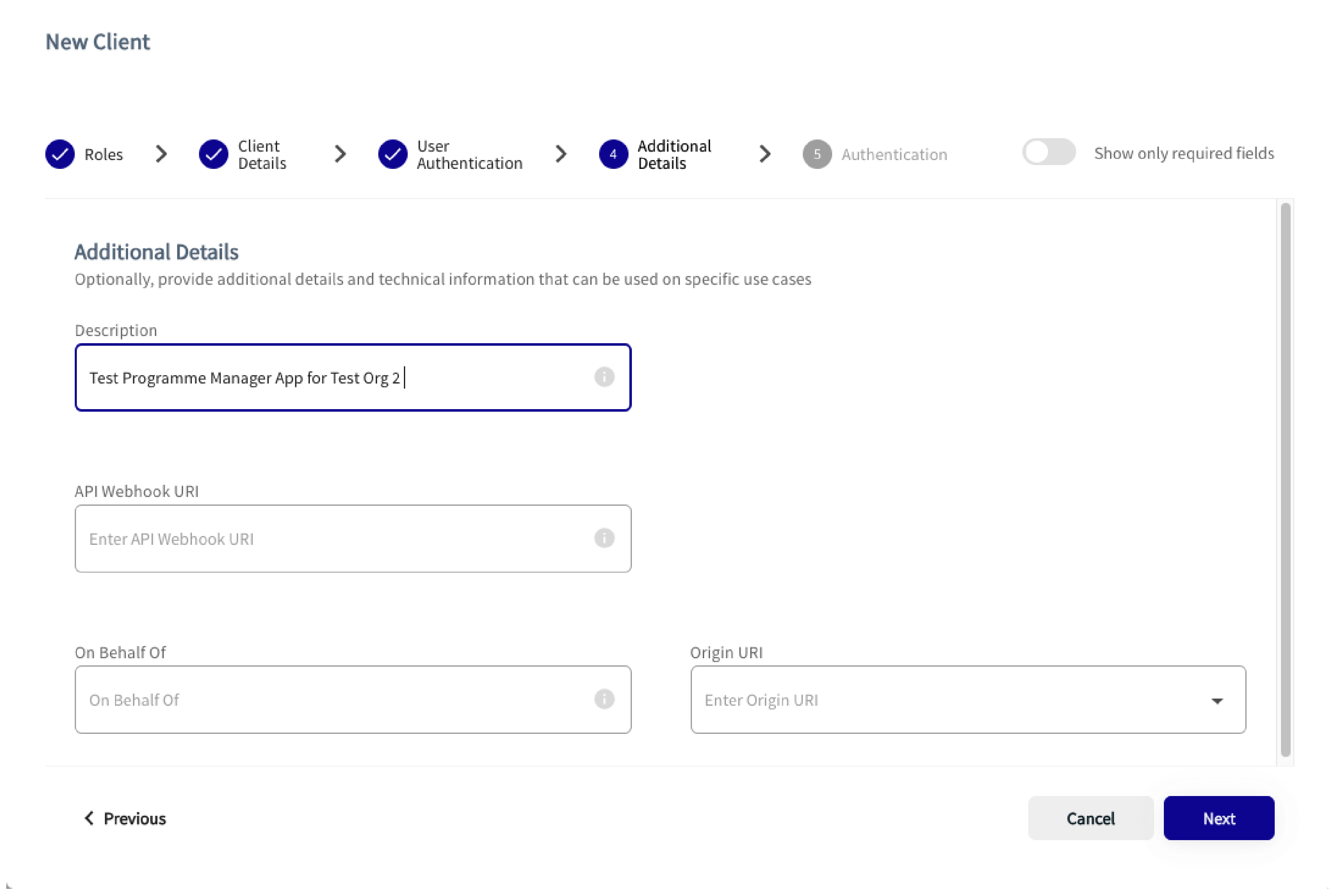
Note: You do not need to fill in the following settings on the page: Policy URL, Terms of Service URI, and the Post Logout Redirect URI.

Field Name	Example Data	Notes
Redirect URI *	https://example.com/callback	The callback URL any Confidential Client expects to be returned. This field is mandatory and you should enter the correct URI format.
Logo URI	https://example.com/logo.png	Company logo URL. This must also include the file format of the logo.

2. Click **Next**.

Type in Additional Details

1. Complete the form by entering details where applicable. The following table describes the fields, all which are optional.


New Client

Roles > Client Details > User Authentication > 4 Additional Details > 5 Authentication

Show only required fields

Additional Details

Optionally, provide additional details and technical information that can be used on specific use cases

Description: Test Programme Manager App for Test Org 2

API Webhook URI: Enter API Webhook URI

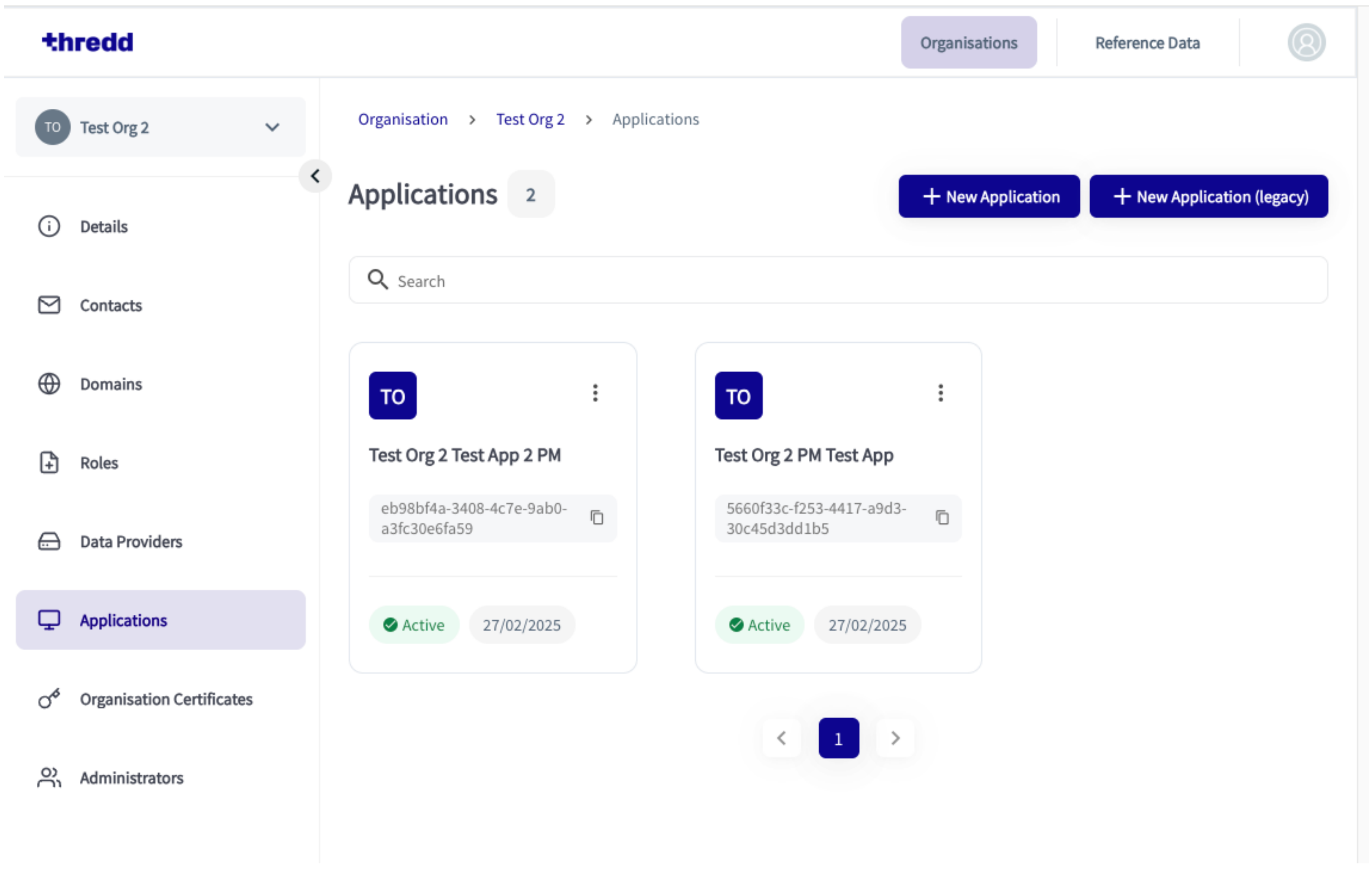
On Behalf Of: On Behalf Of

Origin URI: Enter Origin URI

Field Name	Example Data	Notes
Description	Test Company App 1	Description of the app.
API Webhook URI	-	URI of the webhook.
On Behalf Of	-	On behalf of a particular user.
Origin URI	-	The origin URI.

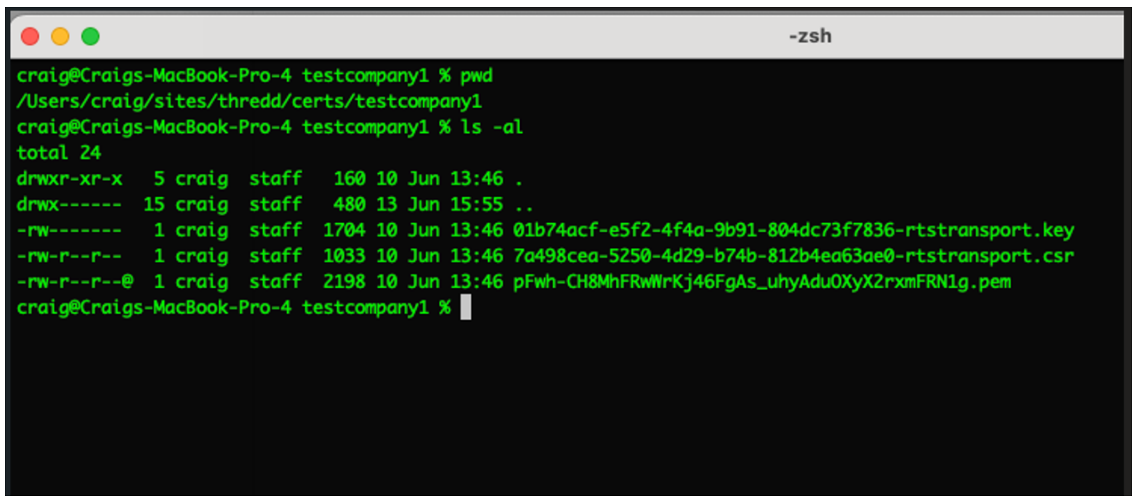
Note: Although not required, it is recommended that you enter a description.

2. Click **Next**.
3. Leave the following fields with their default values: **Token Signed Response Algorithm ID** and **Token Endpoint Authentication Method**. You should also leave **Require Signed Request Object** as enabled.
4. Click **Save**.
5. Ignore the step for adding an extra certificate.
6. Click **Done**. Your new Application appears as a tile on the Applications view.



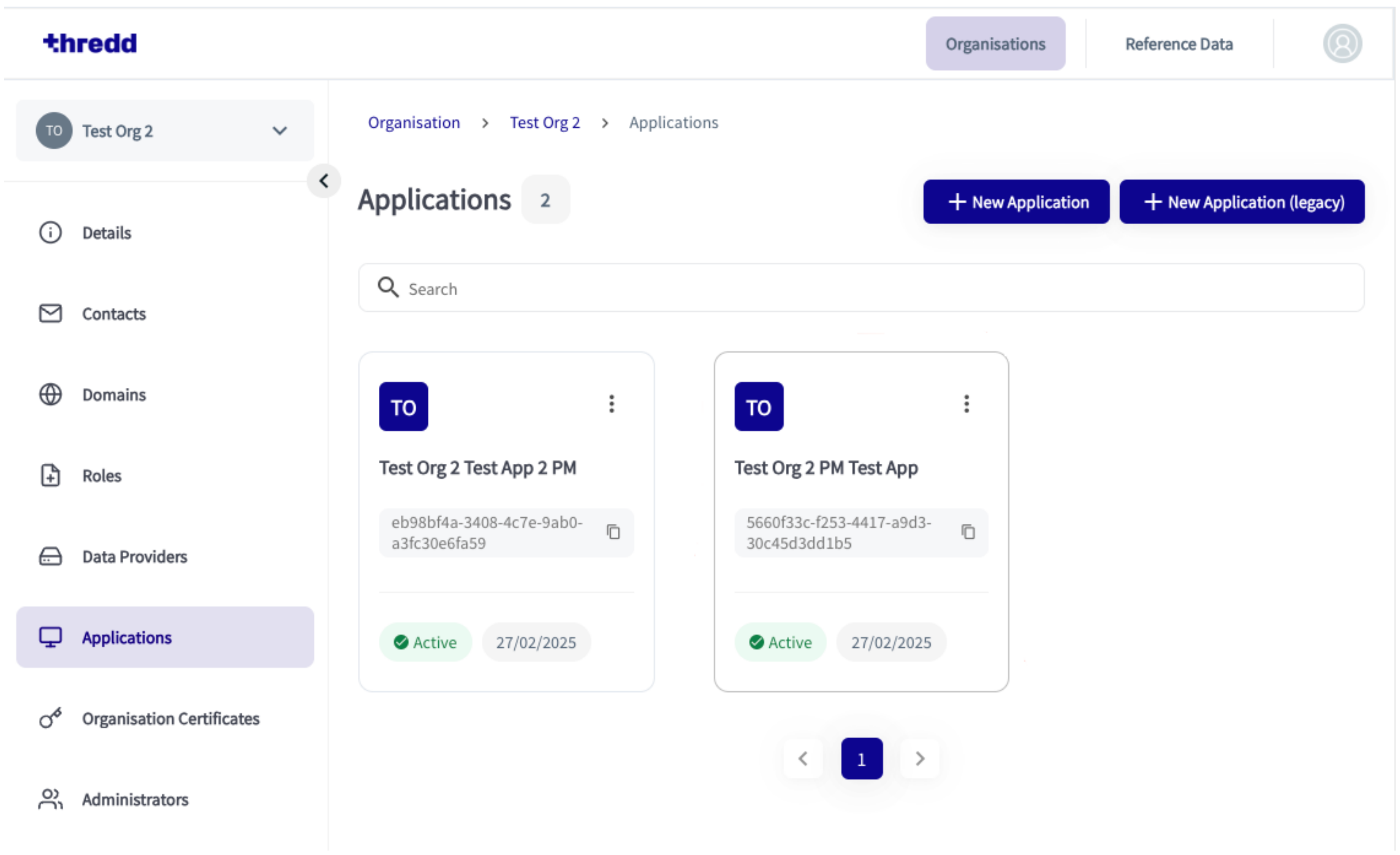
3.2.4 Step 3. Create a New Transport Certificate

1. In a new terminal window, create an empty directory for storing the private key and CSR. The following example shows a key pair and CSR that have been created in a directory.

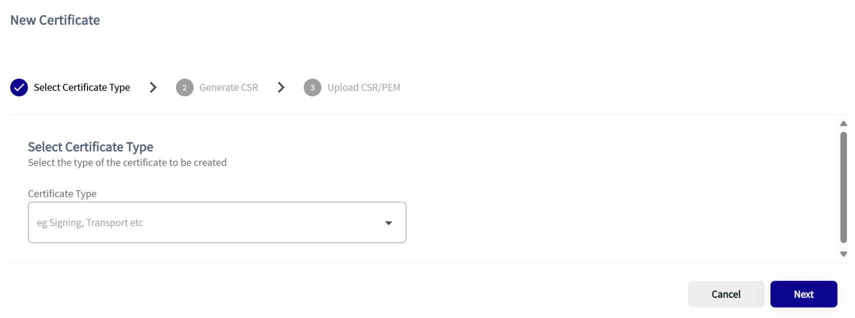


```
craig@Craigs-MacBook-Pro-4 testcompany1 % pwd
/Users/craig/sites/thredd/certs/testcompany1
craig@Craigs-MacBook-Pro-4 testcompany1 % ls -al
total 24
drwxr-xr-x   5 craig  staff   160 10 Jun 13:46 .
drwx------  15 craig  staff   480 13 Jun 15:55 ..
-rw-------   1 craig  staff  1704 10 Jun 13:46 01b74acf-e5f2-4f4a-9b91-804dc73f7836-rtstransport.key
-rw-r--r--   1 craig  staff  1033 10 Jun 13:46 7a498cea-5250-4d29-b74b-812b4ea63ae0-rtstransport.csr
-rw-r--r--@  1 craig  staff  2198 10 Jun 13:46 pFwh-CH8MhFRwWrKj46FgAs_uhyAduOXyX2rxmFRN1g.pem
craig@Craigs-MacBook-Pro-4 testcompany1 %
```

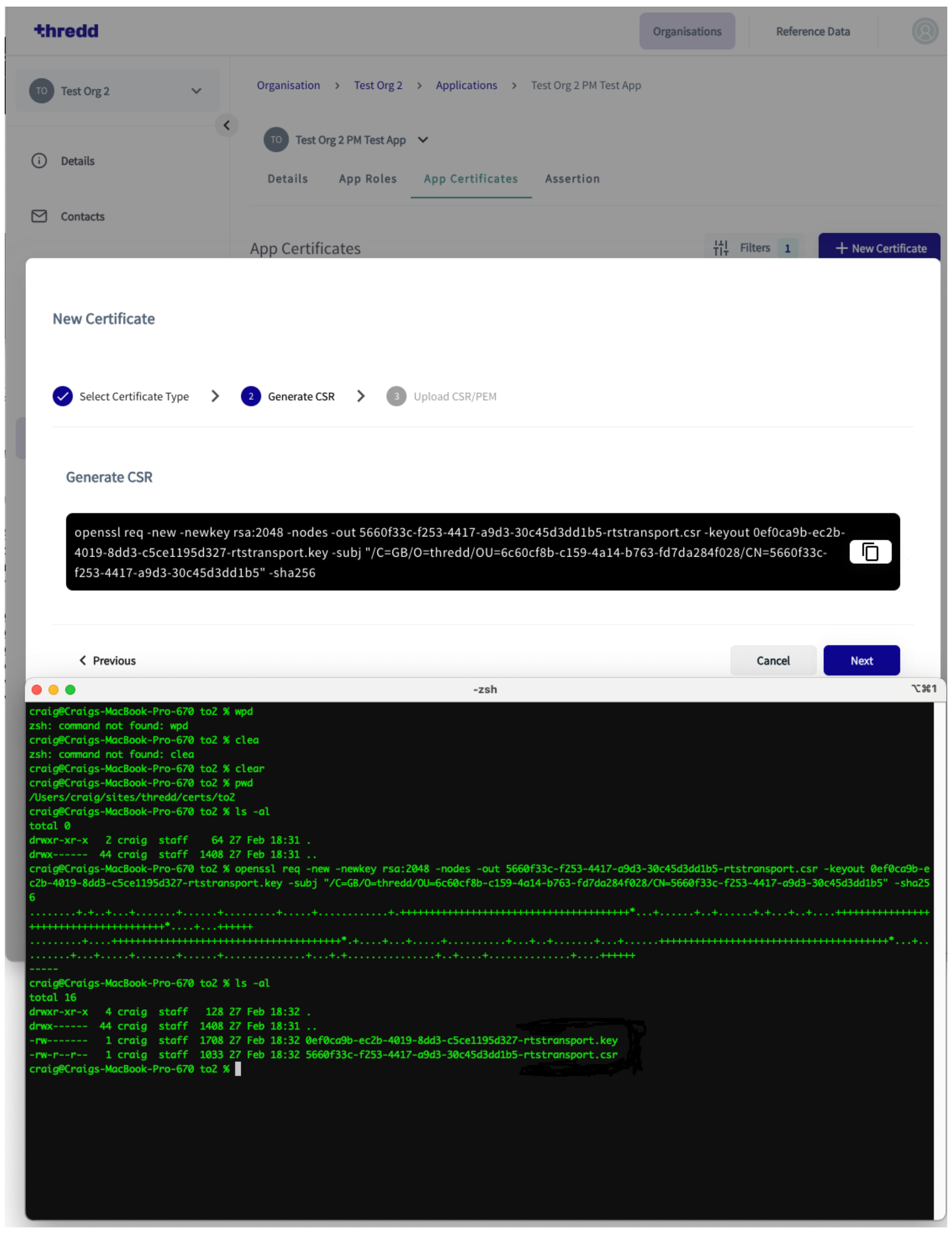
2. In the Thredd CA dashboard, click on the application tile you wish to create new certificates for. The second one below, Test Org 2 PM Test App, is an example.



4. Click the **App Certificates** tab.
5. Click the **New Certificates** button. The New Certificates window appears.



6. Choose **TRANSPORT** from the drop down menu and click **Next**
7. Copy the generated CSR command and paste this into a terminal window. This action generates your private key and CSR.



```
openssl req -new -newkey rsa:2048 -nodes -out 5660f33c-f253-4417-a9d3-30c45d3dd1b5-rtstransport.csr -keyout 0ef0ca9b-ec2b-
4019-8dd3-c5ce1195d327-rtstransport.key -subj "/C=GB/O=thredd/OU=6c60cf8b-c159-4a14-b763-fd7da284f028/CN=5660f33c-
f253-4417-a9d3-30c45d3dd1b5" -sha256
```

```
craig@Craigs-MacBook-Pro-670 to2 % wpd
zsh: command not found: wpd
craig@Craigs-MacBook-Pro-670 to2 % clea
zsh: command not found: clea
craig@Craigs-MacBook-Pro-670 to2 % clear
craig@Craigs-MacBook-Pro-670 to2 % pwd
/Users/craig/sites/thredd/certs/to2
craig@Craigs-MacBook-Pro-670 to2 % ls -al
total 0
drwxr-xr-x   2 craig  staff    64 27 Feb 18:31 .
drwx------  44 craig  staff  1408 27 Feb 18:31 ..
craig@Craigs-MacBook-Pro-670 to2 % openssl req -new -newkey rsa:2048 -nodes -out 5660f33c-f253-4417-a9d3-30c45d3dd1b5-rtstransport.csr -keyout 0ef0ca9b-e
c2b-4019-8dd3-c5ce1195d327-rtstransport.key -subj "/C=GB/O=thredd/OU=6c60cf8b-c159-4a14-b763-fd7da284f028/CN=5660f33c-f253-4417-a9d3-30c45d3dd1b5" -sha25
6
.......+.+..+...+.......+......+.........+.....+...........+.+++++++++++++++++++++++++++++++++++++++*...+......+..+......+.+...+..+....+++++++++++++++
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.........+....+++++++++++++++++++++++++++++++++++++++*.+....+...+.....+..........+...+..+.......+...+......+++++++++++++++++++++++++++++++++++++++*...+..
.......+...+.....+.......+......+.............+...+.+..............+..+....+..............+....++++++
-----
craig@Craigs-MacBook-Pro-670 to2 % ls -al
total 16
drwxr-xr-x   4 craig  staff   128 27 Feb 18:32 .
drwx------  44 craig  staff  1408 27 Feb 18:31 ..
-rw-------   1 craig  staff  1708 27 Feb 18:32 0ef0ca9b-ec2b-4019-8dd3-c5ce1195d327-rtstransport.key
-rw-r--r--   1 craig  staff  1033 27 Feb 18:32 5660f33c-f253-4417-a9d3-30c45d3dd1b5-rtstransport.csr
craig@Craigs-MacBook-Pro-670 to2 % 
```
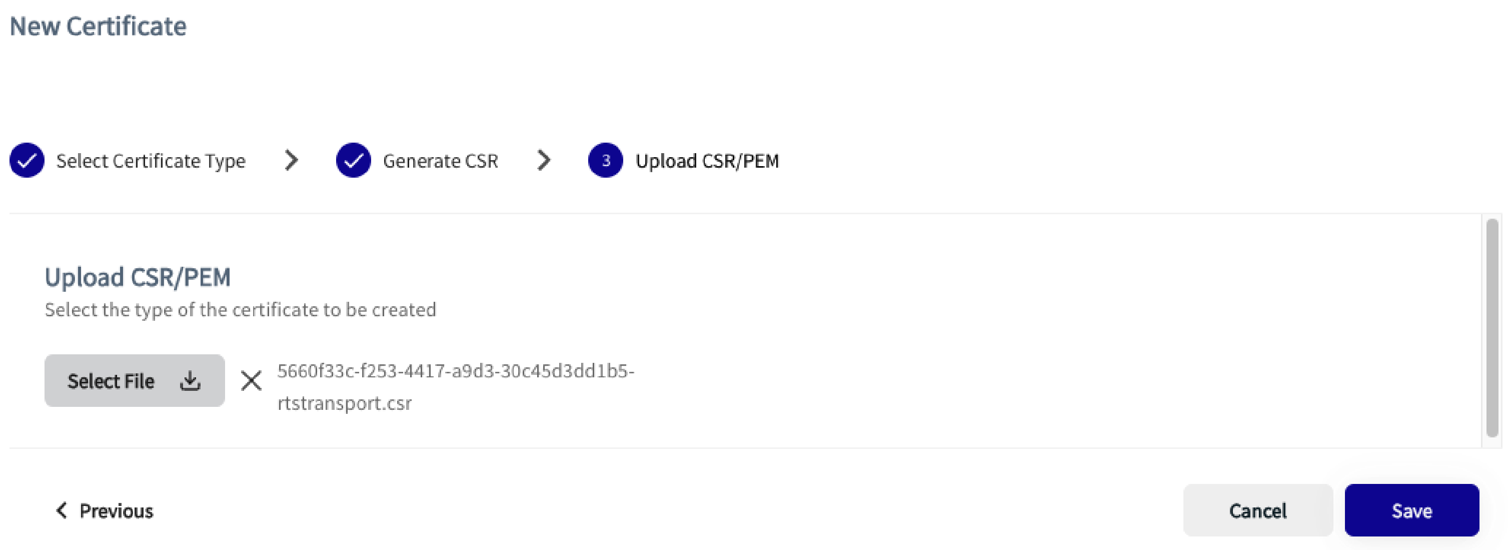

Figure 6: Terminal Window showing new command pasted into the prompt line

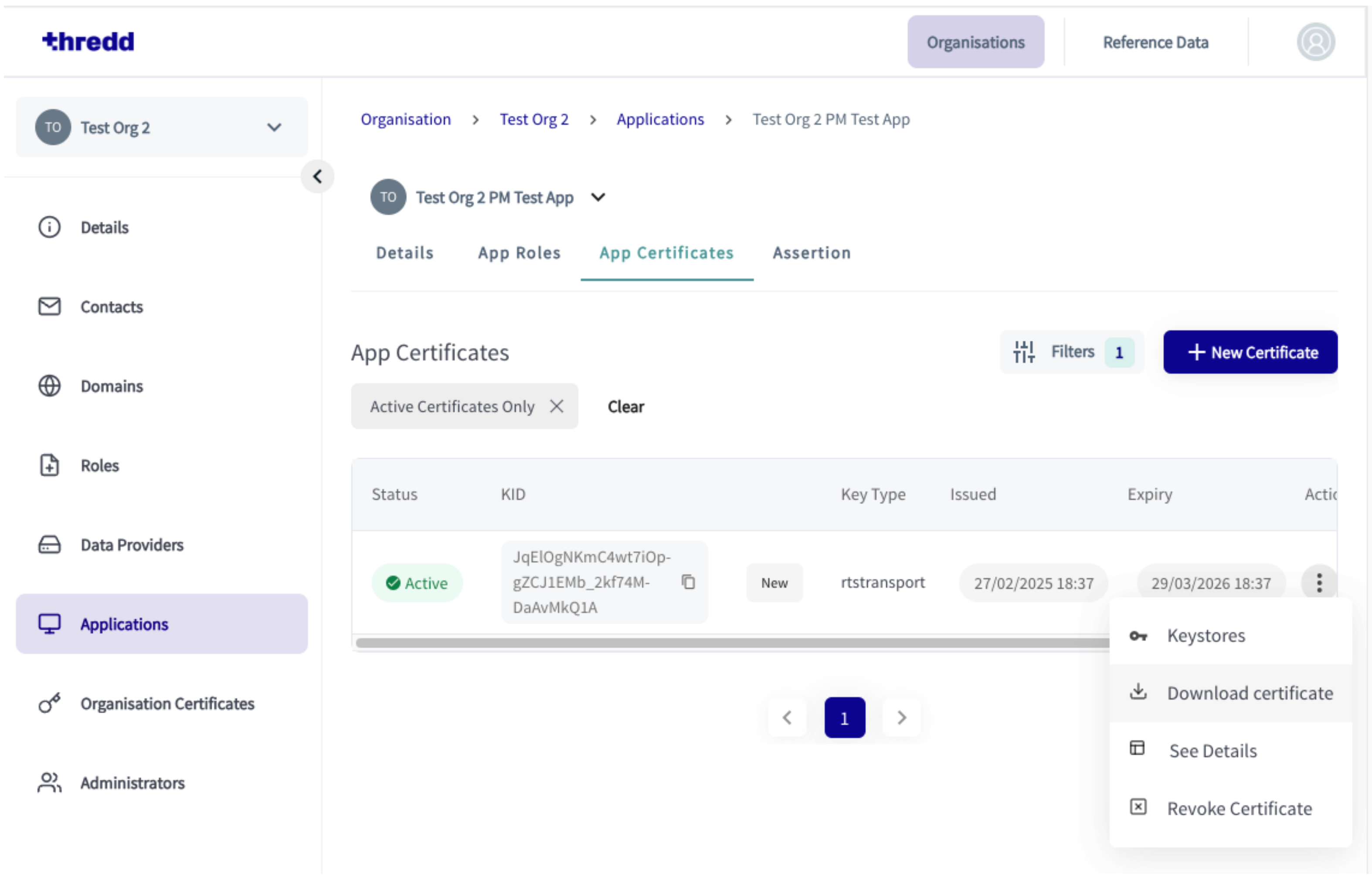
8. Click **Next** when the private key and CSR are generated, and select your CSR file for upload. Once selected, the CSR file appears on the screen.



Select the type of the certificate to be created

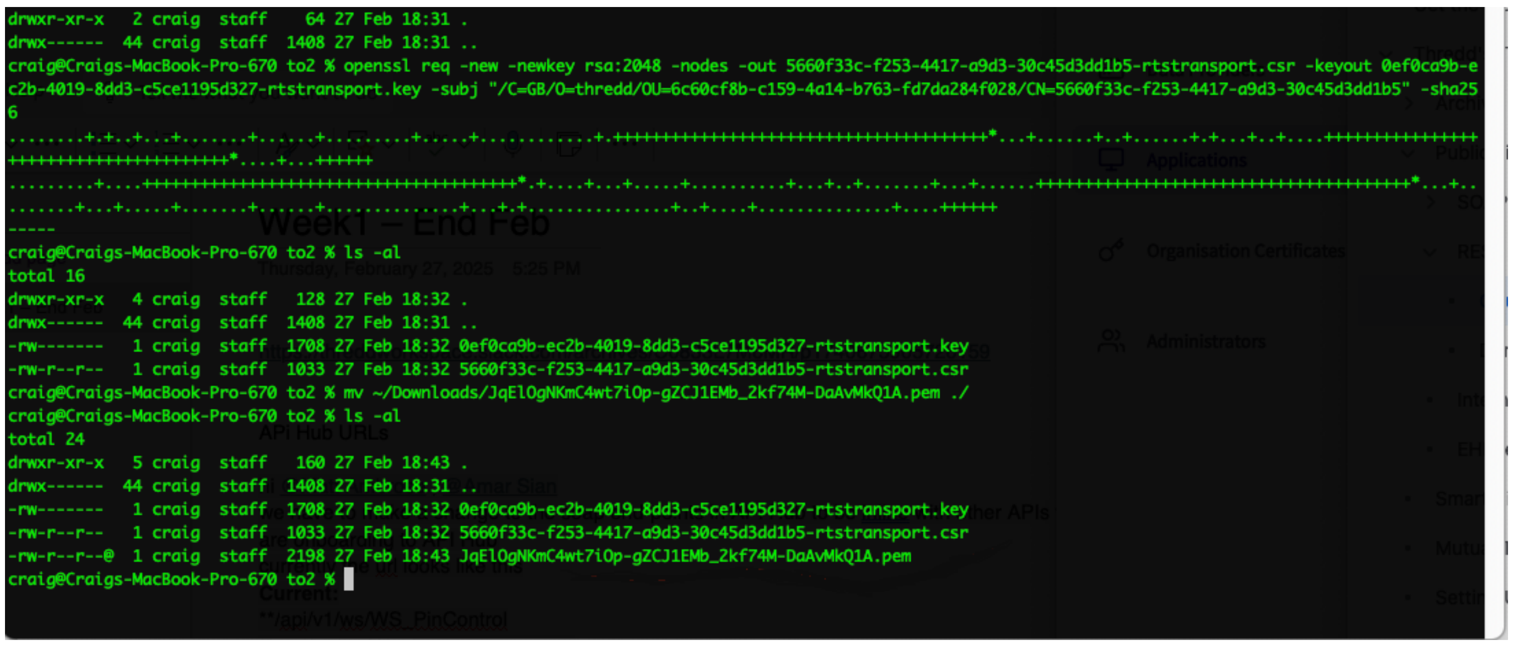
5660f33c-f253-4417-a9d3-30c45d3dd1b5-rtstransport.csr

9. Click **Save**. The signed x.509 certificate appears in your certificate list.



Status	KID		Key Type	Issued	Expiry	Actic
Active	JqElOgNKmC4wt7iOp-gZCJ1EMb_2kf74M-DaAvMkQ1A	New	rtstransport	27/02/2025 18:37	29/03/2026 18:37	

10. Download the certificate and move it to the same folder as the private key and CSR.



```
drwxr-xr-x   2 craig  staff    64 27 Feb 18:31 .
drwx------  44 craig  staff  1408 27 Feb 18:31 ..
craig@Craigs-MacBook-Pro-670 to2 % openssl req -new -newkey rsa:2048 -nodes -out 5660f33c-f253-4417-a9d3-30c45d3dd1b5-rtstransport.csr -keyout 0ef0ca9b-e
c2b-4019-8dd3-c5ce1195d327-rtstransport.key -subj "/C=GB/O=thredd/OU=6c60cf8b-c159-4a14-b763-fd7da284f028/CN=5660f33c-f253-4417-a9d3-30c45d3dd1b5" -sha25
6
........+.+..+...+.......+......+.........+....+..........+.++++++++++++++++++++++++++++++++++++++*...+......+..+......+..+...+..+....+++++++++++++++
+++++++++++++++++++++++*....+...++++++
.........+....+++++++++++++++++++++++++++++++++++++++*.+....+...+.....+..........+...+..+.......+...+......++++++++++++++++++++++++++++++++++++++*...+..
.......+...+.....+.......+......+..............+...+.+..............+..+....+.............+....++++++
-----
craig@Craigs-MacBook-Pro-670 to2 % ls -al
total 16
drwxr-xr-x   4 craig  staff   128 27 Feb 18:32 .
drwx------  44 craig  staff  1408 27 Feb 18:31 ..
-rw-------   1 craig  staff  1708 27 Feb 18:32 0ef0ca9b-ec2b-4019-8dd3-c5ce1195d327-rtstransport.key
-rw-r--r--   1 craig  staff  1033 27 Feb 18:32 5660f33c-f253-4417-a9d3-30c45d3dd1b5-rtstransport.csr
craig@Craigs-MacBook-Pro-670 to2 % mv ~/Downloads/JqElOgNKmC4wt7iOp-gZCJ1EMb_2kf74M-DaAvMkQ1A.pem ./
craig@Craigs-MacBook-Pro-670 to2 % ls -al
total 24
drwxr-xr-x   5 craig  staff   160 27 Feb 18:43 .
drwx------  44 craig  staff  1408 27 Feb 18:31 ..
-rw-------   1 craig  staff  1708 27 Feb 18:32 0ef0ca9b-ec2b-4019-8dd3-c5ce1195d327-rtstransport.key
-rw-r--r--   1 craig  staff  1033 27 Feb 18:32 5660f33c-f253-4417-a9d3-30c45d3dd1b5-rtstransport.csr
-rw-r--r--@  1 craig  staff  2198 27 Feb 18:43 JqElOgNKmC4wt7iOp-gZCJ1EMb_2kf74M-DaAvMkQ1A.pem
craig@Craigs-MacBook-Pro-670 to2 %
```

Figure 7: Open dialog box where you can select your CSR

You can now use the certificate as a Transport Certificate for any OAuth 2.0 client applications.

3.2.5 Step 4. Create a Signing Certificate

Client applications also require a *Signing Certificate* for signing assertions sent to the Authorisation Server. The private key for the signing certificate is used to sign client assertions for authentication as part of the token generation journey.

You need to repeat the steps described in Step 3. Create a New Transport Certificate. When selecting from the **Select Certificate Type** dropdown, select **Signing** in place of **Transport**.

3.3 Using Dynamic Client Registration (DCR) Endpoint Data

This page describes what you need to set for using the DCR endpoints. There are also guidelines on scopes that are required for the DCR endpoint. For details on the DCR endpoints in Postman, refer to the Cards API Website: Accessing Cards API with mTLS.

3.3.1 Adding Base URLs for DCR

For calling the DCR POST endpoint, you need to include the Base URLs within your REST tool, for example, Postman. The Base URLs are the hosts that accept the certificates. The Cards API, the API Hub, and Thredd CA hosts contain unique URLs, which can differ for UAT and Production. The Base URLs are as follows:

- **Cards API**: https://api.uat.threddpay.com/api/v1
- **API Hub**: https://uat-api.thredd.com
- **Thredd Certificate Authority**: https://matls-auth.directory.sandbox.threddid.com

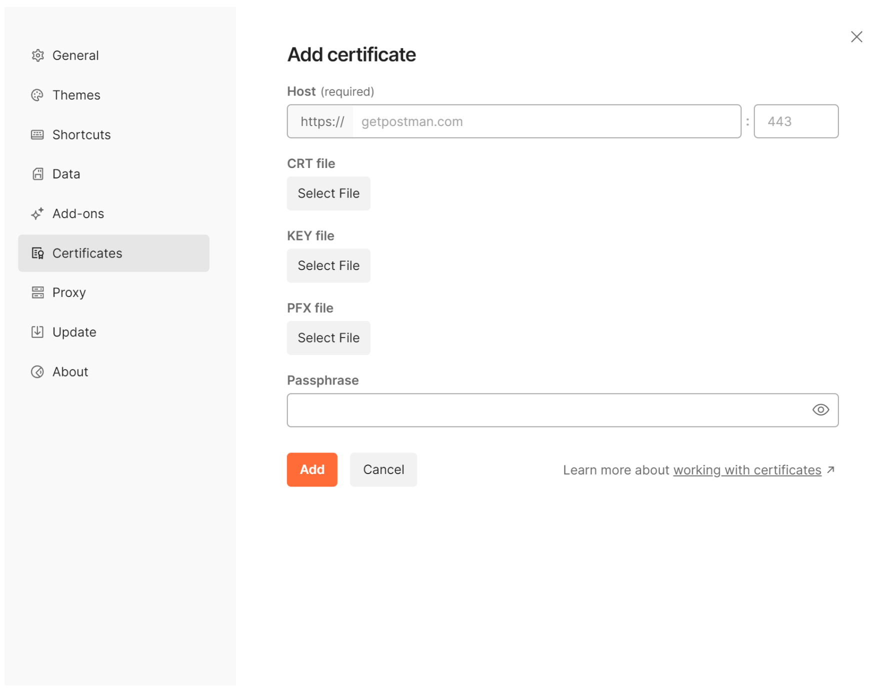
The following are used in Production.

- **API Hub**: https://api.thredd.com/ (for all PRD environments)
- **Cards API**: https://coreapi.threddpay.com

Adding Certificates to Hosts (Postman)

In Postman, you need to include the certificates with the individual hosts. Perform the following steps:

1. Click the gears icon and **Settings**.
2. Click **Certificates** from the left-hand menu.
3. Click **Add Certificate**.



4. Enter a host name.
5. Add CRT and Key files for the host.
6. Click the **Add** button.

For more details, refer to Cards API Website: Accessing the Cards API with mTLS.

3.3.2 Understanding Scopes in the DCR Endpoint

Depending on which Thredd Services you require, your Organisation will have been assigned a number of available Roles which can be chosen when you create your Application. The Scopes are what you can do for those Roles. The Scopes that you can register depend on the Roles your application is registered for. If you include more Scopes than are available for Roles, your application will not accept the new Scopes. This is because the Scopes you include depend on the Roles for the application.

For example, if you application includes the following "scopes":["bulkcard.read", "bulkcard.write" registered for the "bulk cards" role, then you cannot include additional Scopes in the request body. Adding a Scope such as “cards.write to the request body will not be accepted. The following shows an example of a DCR POST request.

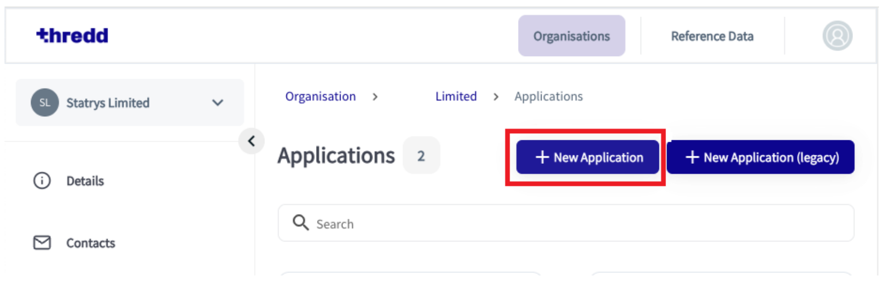
```
{
  "grant_types":[
    "client_credentials"
  ],
  "application_types":[
    "service",
    "dcr"
  ],
  "application_type":"service",
  "token_endpoint_auth_method":"private_key_jwt",
  "id_token_signed_response_alg":"RS256",
  "scopes":[
    "3ds.read",
    "bulkcard.read",
    "bulkcard.write",
    "cards.encrypted",
    "cards.read",
    "cards.sensitive",
    "cards.write",
    "cvv.read",
    "cvv.write",
    "digitalchannel",
    "fraud.read",
    "fraud.write",
    "pin.read",
    "pin.write"
  ],
  "tls_client_certificate_bound_access_tokens":true,
  "request_object_signing_alg":"RS256",
  "response_types":"token",
  "software_statement":"{{ssa}}"
}
```

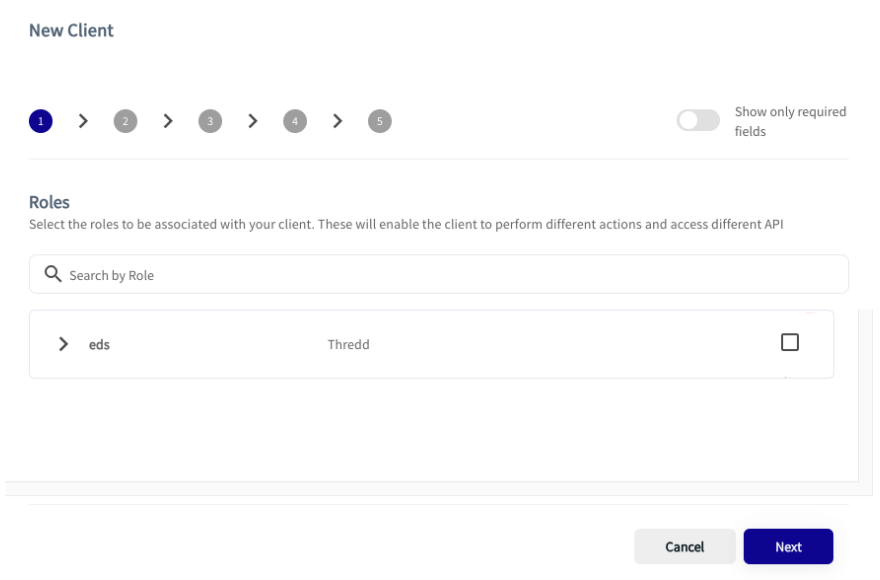
Setting a Role for a Scope

If your application requires a specific Scope, then you need to set the correct Role in Thredd Certificate Authority. When you have chosen the correct Role, you will see the Scope in the DCR request. The following example shows an application using the EDS Scopes of **eds.read** and **eds.write** when you select the **eds** Role in your application on the Thredd Certificate Authority.

For more details on the steps for creating REST certificates in the Thredd Certificate Authority dashboard, refer to Creating Client Application Certificates for REST APIs.

1. Click **New Application**.
   The Roles for the application appear.




New Client

Show only required fields

Roles

Select the roles to be associated with your client. These will enable the client to perform different actions and access different API

eds	Thredd	☐

2. Select the Role, in this case **eds** and click **Next**.
3. When you run the DCR request, you will see the eds scopes. See the example below.

```
{
  "grant_types":[
    "client_credentials"
  ],
  "application_types":[
    "service",
    "dcr"
  ],
  "application_type":"service",
  "token_endpoint_auth_method":"private_key_jwt",
  "id_token_signed_response_alg":"RS256",
  "scopes":[
    "3ds.read",
    "bulkcard.read",
    "bulkcard.write",
    "cards.encrypted",
    "cards.read",
    "cards.sensitive",
    "cards.write",
    "eds.read",
    "eds.write",
    "cvv.read",
    "cvv.write",
    "digitalchannel",
    "fraud.read",
    "fraud.write",
    "pin.read",
    "pin.write"
  ],
  "tls_client_certificate_bound_access_tokens":true,
  "request_object_signing_alg":"RS256",
  "response_types":"token",
  "software_statement":"{{ssa}}"
}
```

Updating Roles and Scopes

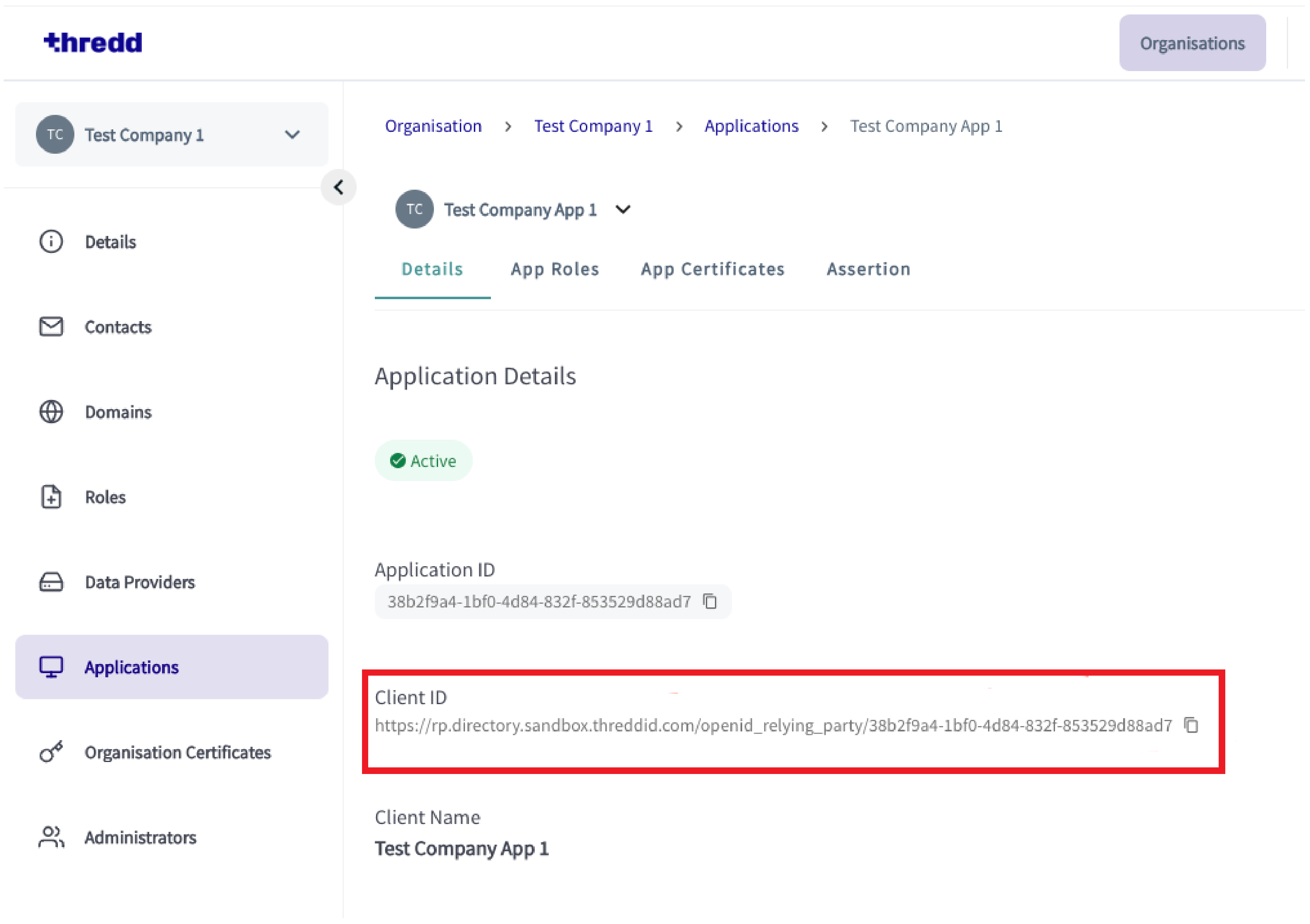
If required, you can update the Roles of an Application and the Scopes that your OAuth Client has registered. You may need new Scopes, for example, if a new service is added to Thredd and the organisation requires them. New Scopes may be part of an existing or new Role. This depends on if you have access to the following variables: `registration_access_token` and the `registration_client_uri` (for details on these variables refer to Identifying and Storing the registration_access_token and registration_client_uri Data). To add Roles or Scopes there are a number of workflows to do this.

Note: For more details on the Postman steps refer to the Cards API Website: Access the Cards API with mTLS.

Note: Once you have performed a DCR POST or DCR PUT for adding or updating a client, contact Thredd so that we can update your Programme Manager (or Issuer) metadata related to the newly-registered or updated OAuth client.

Thredd Deletes a Client and Customer Creates a New One

If you do not have access to the registration variables, you need to request Thredd to delete your existing OAuth Client. Once Thredd have deleted the OAuth Client, you can then create it again using the DCR POST request in Postman. Provide Thredd with the Client ID from the Thredd Certificate Authority Dashboard under **Applications > (Your Application) > Details**.



thredd

Organisations

Test Company 1

Organisation > Test Company 1 > Applications > Test Company App 1

Test Company App 1

Details | App Roles | App Certificates | Assertion

- Details
- Contacts
- Domains
- Roles
- Data Providers
- Applications
- Organisation Certificates
- Administrators

Application Details

Active

Application ID
38b2f9a4-1bf0-4d84-832f-853529d88ad7

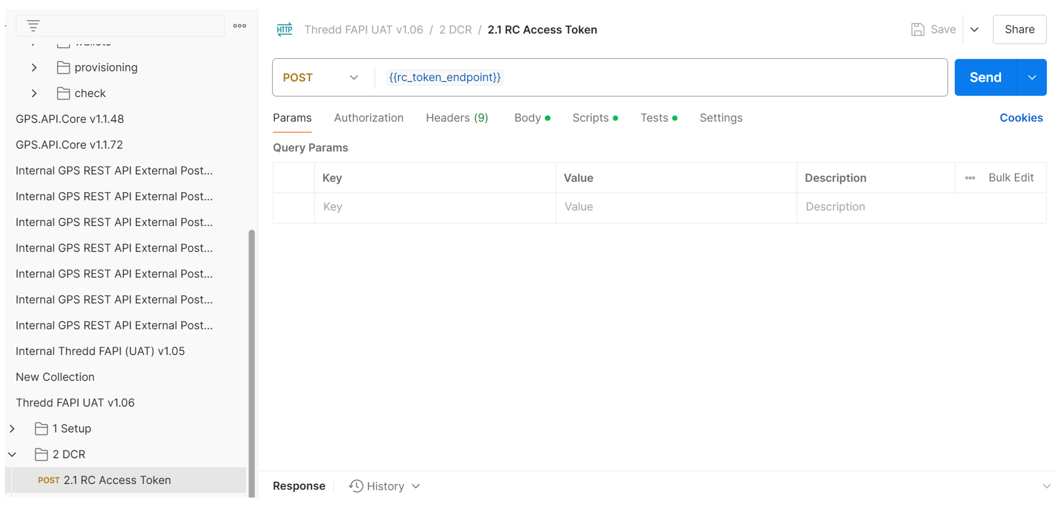
Client ID
https://rp.directory.sandbox.threddid.com/openid_relying_party/38b2f9a4-1bf0-4d84-832f-853529d88ad7

Client Name
Test Company App 1

Customer Deletes an existing Client and Creates a New One

You should follow this method if you have access to the registration variables.

1. Use Postman to obtain a new access token.



Thredd FAPI UAT v1.06 / 2 DCR / 2.1 RC Access Token

POST {{rc_token_endpoint}}

Params | Authorization | Headers (9) | Body | Scripts | Tests | Settings | Cookies

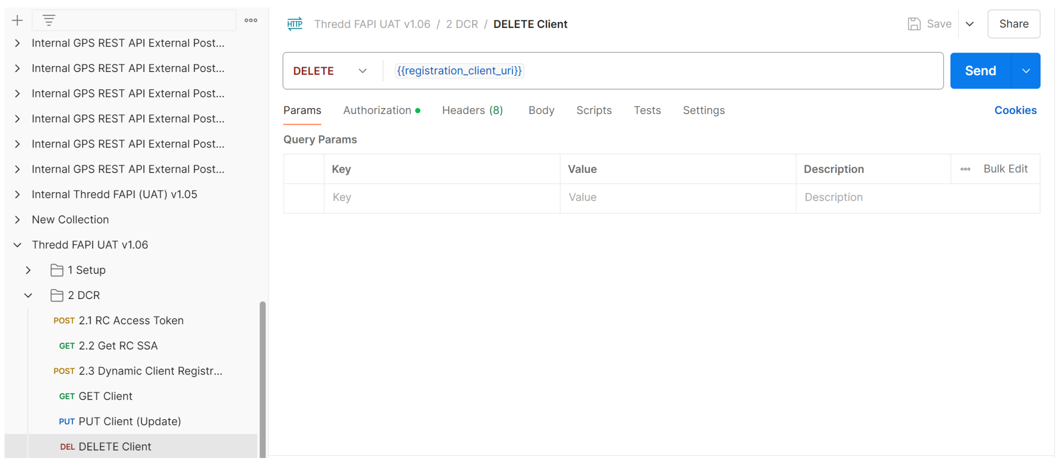
Query Params

Key	Value	Description
Key	Value	Description

- provisioning
- check
- GPS.API.Core v1.1.48
- GPS.API.Core v1.1.72
- Internal GPS REST API External Post...
- Internal GPS REST API External Post...
- Internal GPS REST API External Post...
- Internal GPS REST API External Post...
- Internal GPS REST API External Post...
- Internal GPS REST API External Post...
- Internal GPS REST API External Post...
- Internal Thredd FAPI (UAT) v1.05
- New Collection
- Thredd FAPI UAT v1.06
  - 1 Setup
  - 2 DCR
    - POST 2.1 RC Access Token

Response | History

2. Run the DCR Delete request in Postman.


Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal Thredd FAPI (UAT) v1.05
New Collection
Thredd FAPI UAT v1.06
1 Setup
2 DCR
POST 2.1 RC Access Token
GET 2.2 Get RC SSA
POST 2.3 Dynamic Client Registr...
GET GET Client
PUT PUT Client (Update)
DEL DELETE Client
Save
Share
Send
Params
Authorization
Headers (8)
Body
Scripts
Tests
Settings
Cookies
Bulk Edit

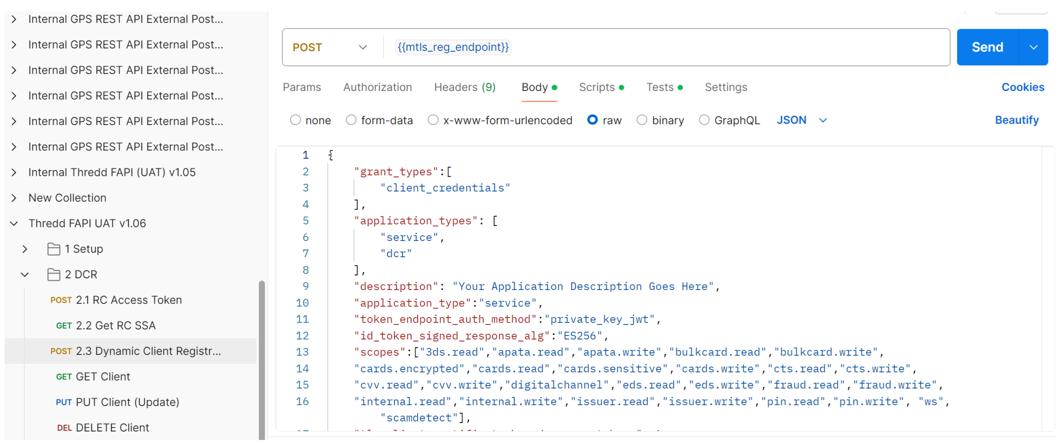
Thredd FAPI UAT v1.06 / 2 DCR / DELETE Client

DELETE {{registration_client_uri}}

Query Params

Key	Value	Description
Key	Value	Description

3. Run the SSA request in Postman.
4. Run the DCR POST request


Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal Thredd FAPI (UAT) v1.05
New Collection
Thredd FAPI UAT v1.06
1 Setup
2 DCR
POST 2.1 RC Access Token
GET 2.2 Get RC SSA
POST 2.3 Dynamic Client Registr...
GET GET Client
PUT PUT Client (Update)
DEL DELETE Client
Send
Params
Authorization
Headers (9)
Body
Scripts
Tests
Settings
Cookies
none
form-data
x-www-form-urlencoded
raw
binary
GraphQL
JSON
Beautify

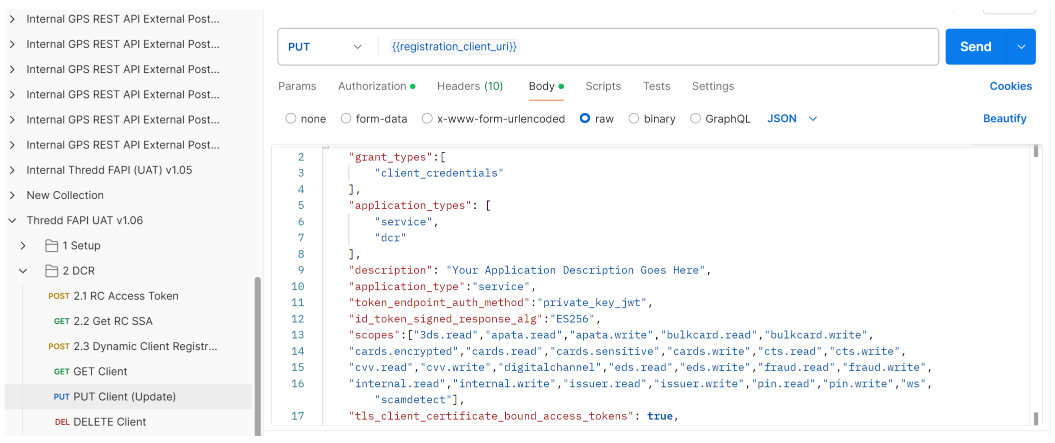
POST {{mtls_reg_endpoint}}

```
{
    "grant_types":[
        "client_credentials"
    ],
    "application_types": [
        "service",
        "dcr"
    ],
    "description": "Your Application Description Goes Here",
    "application_type":"service",
    "token_endpoint_auth_method":"private_key_jwt",
    "id_token_signed_response_alg":"ES256",
    "scopes":["3ds.read","apata.read","apata.write","bulkcard.read","bulkcard.write",
    "cards.encrypted","cards.read","cards.sensitive","cards.write","cts.read","cts.write",
    "cvv.read","cvv.write","digitalchannel","eds.read","eds.write","fraud.read","fraud.write",
    "internal.read","internal.write","issuer.read","issuer.write","pin.read","pin.write", "ws",
        "scamdetect"],
```

Customer Updates the Client Using the PUT Method

To update the OAuth Client, you can use the DCR PUT method. This is provided that you have access to the registration variables.

Run the DCR PUT request.


Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal GPS REST API External Post...
Internal Thredd FAPI (UAT) v1.05
New Collection
Thredd FAPI UAT v1.06
1 Setup
2 DCR
POST 2.1 RC Access Token
GET 2.2 Get RC SSA
POST 2.3 Dynamic Client Registr...
GET GET Client
PUT PUT Client (Update)
DEL DELETE Client
Send
Params
Authorization
Headers (10)
Body
Scripts
Tests
Settings
Cookies
none
form-data
x-www-form-urlencoded
raw
binary
GraphQL
JSON
Beautify

PUT {{registration_client_uri}}

```
    "grant_types":[
        "client_credentials"
    ],
    "application_types": [
        "service",
        "dcr"
    ],
    "description": "Your Application Description Goes Here",
    "application_type":"service",
    "token_endpoint_auth_method":"private_key_jwt",
    "id_token_signed_response_alg":"ES256",
    "scopes":["3ds.read","apata.read","apata.write","bulkcard.read","bulkcard.write",
    "cards.encrypted","cards.read","cards.sensitive","cards.write","cts.read","cts.write",
    "cvv.read","cvv.write","digitalchannel","eds.read","eds.write","fraud.read","fraud.write",
    "internal.read","internal.write","issuer.read","issuer.write","pin.read","pin.write","ws",
        "scamdetect"],
    "tls_client_certificate_bound_access_tokens": true,
```

3.3.3 Identifying and Storing the registration_access_token and registration_client_uri Data

The registration_access_token and the registration_client_uri settings are returned in the response of the DCR endpoint. You **must** store these settings securely in order to use them again.

The following example response includes: "registration_access_token": "PKW64FAixrjhxewTH9lR26o7m6_GvbL6RKWv0x5mIM.dWPLOrdXw7yGu2R1HAWlx8dSr3Jf-thb_zNFEGSOUNg" and "registration_client_uri": "https://auth.uat.threddid.com/confidential-clients/oauth2/register/https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4".

```
{
  "client_name":"Test Org 4",
  "description":"",
  "client_uri":"",
  "logo_uri":"https://example.com/logo.png",
  "policy_uri":"",
  "tos_uri":"",
  "organisation_id":"",
  "client_id":"https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4",
  "application_type":"service",
  "application_types":[
    "service",
    "dcr"
  ],
  "redirect_uris":[
    "https://example.com/cb"
  ],
  "grant_types":[
    "client_credentials"
  ],
  "response_types":[
    "token"
  ],
  "scope":"3ds.read bulkcard.read bulkcard.write cards.encrypted cards.read cards.sensitive cards.write cvv.read cvv.write digit-
alchannel fraud.read fraud.write internal.read internal.write issuer.read issuer.write pin.read pin.write",
  "scopes":[
    "3ds.read",
    "bulkcard.read",
    "bulkcard.write",
    "cards.encrypted",
    "cards.read",
    "cards.sensitive",
    "cards.write",
    "cvv.read",
    "cvv.write",
    "digitalchannel",
    "fraud.read",
    "fraud.write",
    "internal.read",
    "internal.write",
    "issuer.read",
    "issuer.write",
    "pin.read",
    "pin.write"
  ],
  "audience":[
    "https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4"
  ],
  "token_endpoint_auth_method":"private_key_jwt",
  "revocation_endpoint_auth_method":"private_key_jwt",
  "introspection_endpoint_auth_method":"private_key_jwt",
  "token_exchange":{
    "actor_claims":null
  },
  "token_endpoint_auth_signing_alg":"",
  "jwks":{
    "keys":[
    ]
  },
  "jwks_uri":"https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/b9f04639-cdeb-425b-a310-
450d3d293fd4/application.jwks",
  "request_object_signing_alg":"RS256",
  "request_object_encryption_alg":"",
  "request_object_encryption_enc":"",
  "request_uris":[

  ],
  "client_id_issued_at":1723556609,
  "created_at":"2024-08-13T13:43:29.619067912Z",
  "updated_at":"2024-08-13T13:43:29.619067912Z",
  "client_secret_expires_at":0,
  "sector_identifier_uri":"https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/b9f04639-cdeb-
425b-a310-450d3d293fd4/redirect_uris.json",
  "userinfo_signed_response_alg":"none",
  "id_token_signed_response_alg":"ES256",
  "id_token_encrypted_response_alg":"",
  "id_token_encrypted_response_enc":"",
  "tls_client_certificate_bound_access_tokens":true,
  "tls_client_auth_subject_dn":"",
  "tls_client_auth_san_dns":"",
  "tls_client_auth_san_uri":"",
  "tls_client_auth_san_ip":"",
  "tls_client_auth_san_email":"",
  "privacy":{
    "scopes":null
  },
  "subject_type":"pairwise",
  "backchannel_token_delivery_mode":"",
  "backchannel_client_notification_endpoint":"",
  "backchannel_authentication_request_signing_alg":"",
  "backchannel_user_code_parameter":false,
  "require_pushed_authorization_requests":false,
  "authorization_signed_response_alg":"ES256",
  "authorization_encrypted_response_alg":"",
  "authorization_encrypted_response_enc":"",
  "dpop_bound_access_tokens":false,
  "authorization_details_types":null,
  "post_logout_redirect_uris":[
  ],
  "app_url":"",
  "backchannel_logout_uri":"",
  "backchannel_logout_session_required":false,
  "client_secret":"xT4SDSlIp9J3aLMIHMtQ99Uok6onqaQJEiQ0Hp2QBXc",
  "hashed_secret":"c2d-
c89f-
d3581d6222a7a143f173a4696feee7773f4156ada52c241eea25b30990f-
b35f2-
faa42105f1e51895d-
d7ced75f0847659f6396f-
bc977cf71d73-
bef7a1a7f93830e871ae9f-
b767318b0c545ee9543dc8ae94044cfc8a9b26bcf8bad53e3ba00ef889d1d8338dfdbdedd1aed382b51a86cf5f08d21d4cbf6f23d66141c50",
  "software_id":"b9f04639-cdeb-425b-a310-450d3d293fd4",
  "software_version":"1.00",
  "software_statement":"eyJraWQiOiJz-
aWduZXIiLCJ0eXAiOiJKV1QiLCJh-
bGciOiJQUzI1NiJ9.eyJzb2Z0d2FyZV9zdGF0ZW1lb-
nRfcm9sZXMiOlt-
dLCJvcm-
dfandrc190cmFuc3BvcnRf-
dXJpI-
joi-
aHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vOTliMmI1OTk-
tOGNjMi00OTllLWI4MDUtZTNkODQyMzNhZThlL3RyYW5zcG9y-
dC5qd2tzIi-
wiYXBpX3dlYm-
hvb2t-
fdXJp-
cyI6W10sIm9yZ19zdGF0dXMiOiJBY3Rp-
dmUiLCJs-
b2d-
vX3Vy-
aSI6Im-
h0dHBzOi8vZXh-
hbXBsZS5jb20vbG9nby5wbm-
ciLCJy-
b2xl-
cyI6W10sIm-
lzcyI6InRocmVkZCBzYW5kYm94IFNTQSBp-
c3N1ZXIiLCJvcm-
dfandrc190cmFuc3BvcnR-
faW5hY3Rp-
dmVf-
dXJpI-
joi-
aHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vOTliMmI1OTk-
tOGNjMi00OTllLWI4MDUtZTNkODQyMzNhZThlL2luYWN0aXZlL3RyYW5zcG9y-
dC5qd2tzIi-
```

```
wiY2x-
pZW50X2lkI-
joi-
aHR0cHM6Ly9ycC5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vb3Bl-
bmlkX3Jl-
bHlpb-
mdfcGFy-
dHk-
vYjlmMDQ2Mzk-
tY2RlYi00MjViLWEzMTAtNDUwZDNkMjkzZmQ0Ii-
wiY2x-
pZW50X2Rl-
c2Ny-
aXB0aW9uI-
joiVGVzdCBPcm-
cgNCBp-
cyBhIEN1c3RvbWVyIG9mIFRocmVkZCIsIm1vZGUiOiJMaXZlIi-
wic29m-
dHd-
hcmV-
faWQiOiJiOWYwNDYzOS1jZGViLTQyNWItYTMxMC00NTBkM2QyOTNmZDQiLCJzb2Z0d2FyZV92ZXJz-
aW9uI-
joiMS4wMCIsIm9yZ19uYW1lI-
joiVGVzdCBPcm-
cgNCIsInNvZnR3YXJlX2ZsYWdzIjp7fSwib3JpZ2luX3Vy-
aXMiOlt-
dLCJjbGllb-
nRf-
bmFtZSI6IlRl-
c3QgT3JnIDQiLCJpYXQiOjE3MjM1NTYzNTAsIm-
p3a3Nf-
dHJhb-
nNw-
b3J0X3Vy-
aSI6Im-
h0dHBzOi8va2V5c3RvcmUuZGlyZWN0b3J5LnNhb-
mRib3gudGhyZWRkaWQuY29tLzk5YjJiNTk5LThjYzItNDk5ZS1iODA1LWUzZDg0MjMzYWU4ZS9iOWYwNDYzOS1jZGViLTQyNWItYTMxMC00NTBkM2QyOTNmZDQvdHJhb-
nNw-
b3J0Lm-
p3a3MiLCJvcm-
dhbm-
lzYXRp-
b25f-
dGFncyI6W10sInN1Ym-
plY3Rf-
dHl-
wZSI6InBhaXJ3aXNlIi-
wicmVkaXJlY3Rf-
dXJp-
cyI6WyJodHRw-
czovL2V4YW1w-
bGUuY29tL2NiIl0sInNlY3Rvcl9pZGVudGl-
maWVyX3Vy-
aSI6Im-
h0dHBzOi8va2V5c3RvcmUuZGlyZWN0b3J5LnNhb-
mRib3gudGhyZWRkaWQuY29tLzk5YjJiNTk5LThjYzItNDk5ZS1iODA1LWUzZDg0MjMzYWU4ZS9iOWYwNDYzOS1jZGViLTQyNWItYTMxMC00NTBkM2QyOTNmZDQvcmVkaXJ-
lY3Rf-
dXJpcy5qc29uIi-
wib3JnX2p3a3N-
faW5hY3Rp-
dmVf-
dXJpI-
joi-
aHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vOTliMmI1OTk-
tOGNjMi00OTllLWI4MDUtZTNkODQyMzNhZThlL2luYWN0aXZlL2Fw-
cGx-
pY2F0aW9uLm-
p3a3MiLCJvcm-
dhbm-
lzYXRp-
b25fZmx-
hZ3MiOnt9LCJqd2tzX3RyYW5zcG9y-
dF9pb-
```

```
YTMxMC00NTBkM2QyOTNmZDQvaW5hY3Rp-
dmUvYXBw-
bGljYXRp-
b24uandrcyIsIm9yZ19udW1iZXIiOiIwMDAwMDAwNCIsIm-
p3a3Nf-
dXJpI-
joi-
aHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vOTliMmI1OTk-
tOGNjMi00OTllLWI4MDUtZTNkODQyMzNhZThlL2I5ZjA0NjM5LWNkZWItNDI1Yi1hMzEwLTQ1MGQzZDI5M2ZkNC9h-
cHBsaWNhdGlvbi5qd2tzIiwic3RhdHVzIjoiQWN0aXZlIiwib3JnYW5pc2F0aW9uX2NvbXBldGVudF9hdXRob3JpdHlfY2xhaW1zIjpbXX0.N5wPwnVFcramX7BAYOWn_
1tWcLxSRNaIxst-ZK_p29he5mN1_hdFF6BoVMG0Chh-dV_FL4-luQlg7Qn3EMRCb3RWp8U7pcj0lmFSDcUyvlQpoB5hqrXgjPEOkIC7uqJuTDjwakj0NFtJDtK_l_FVp-
PA2ZsDJanwCxsnxxMxVFlxFPwCYk8jBTNE84zx092a4-Tj4VfE4e5S5HA7if8sR7PiXvAMWs1jBrUQ9enWacfu_Xno_-kywtrkAeR4fi-MGNeA4Ik-
bYbh8LyhMjg3XXun87BoL8-b_An5fX5y-XS8VnENg3NFU3D8soQ05OKlXnIDT2Dp7v1lFlNYrV1jO9w",
  "dynamically_registered":true,
  "registration_access_token":"PKW64FAixrjhxewTH9lR26o7m6_GvbL6RKWv0x5mIM.dWPLOrdXw7yGu2R1HAWlx8dSr3Jf-thb_zNFEGSOUNg",
  "registration_client_uri":"https://auth.uat.threddid.com/confidential-cli-
ents/oauth2/register/https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4",
  "registration_access_token_expires_in":0
}
```

Section 4: EHI Setup

You should read this section to understand the setup steps for EHI.

Topics covered in this section:

- Setting Up EHI with mTLS

4.1 Setting Up EHI with mTLS

This section describes how to set up the External Host Interface (EHI) to communicate with Thredd using Mutual Transport Level Security (mTLS). This involves:

1. Setting up both server and client certificates for the mTLS connection.
2. Testing the certificates to prove the establishment of the mTLS connection.

To find out where mTLS exists in the network infrastructure between Thredd and your EHI endpoint, refer to background information in Message Architecture Between Thredd and EHI . For information on boosting security in the mTLS setup, see Additional Security Controls.

4.1.1 Overview of mTLS in EHI

mTLS is used where both parties must prove their identities to each other for authentication, in this case Thredd and yourself, the Client. The server and the client present their respective certificates and private keys to verify who they claim to be. The high-level communication flow is as follows:

1. The client (Thredd) connects to the server (you, the Client)
2. The server (you) presents your certificate.
3. The client (Thredd) verifies your certificate.
4. The client (Thredd) presents their certificate.
5. The server (you) verifies the client's certificate.

Once both certificates are verified, the server grants access. The client and server then exchange information over the secure connection.

mTLS relies on a system of digitally signed certificates issued by a trusted third party called a certificate authority (CA). The CA proves the authenticity of the public key and the identity of the server presenting the key. In addition to the server certificate, you also needs to have root and leaf certificates for validation. This ensures that a Chain of Trust is established. For a more detailed description on mTLS, refer to the descriptions on the CloudFlare website.

4.1.2 Set Up Certificates on the Server

You first need to set up the server certificates on your EHI server. The EHI server validates the client certificates that Thredd sends to you.

1. Obtain a Server Certificate from a Certificate of Authority vendor, such as Verizon or Digicert or Amazon Web Services.
2. Install certificates on your EHI listening endpoint. The certificates are as follows:

- **Server or Leaf Certificate** – this certificate is issued to individual servers by a CA. This certificate provides the “leaf” of a hierarchical tree of authority that’s traceable to the trusted root certificate.
- **Intermediate or Issuing Certificate** – this is a digital representation of a computer's identity in the PKI system, containing the public encryption key of the system, the purpose of the certificate, the identity of the issuing Certificate Authority, the validity period, and the bearer's name and digital signature.
- **Root or CA Certificate** – this enables an organisation to be their own Certificate Authority. This certificate also contains the public key. Typically, the certificate is installed on the server.

4.1.3 Store the Client Certificates

As Thredd sends you a Client Certificate, your server verifies the incoming certificate by matching it against the information held in Thredd's Certificate Authority’s Root and Issuing Certificates. You need to store the CA's Root and Issuing Certificates on your mTLS termination point. The steps for storing depend on your CA Vendor. For example, the steps may differ if your vendor is Alibaba Cloud or AWS.

Note: The mTLS termination point is part of the infrastructure that manages the mTLS communication, and is where the certificates are stored.

The following are the Sandbox Certificates for UAT

Certificate Type	URL
Root	https://crl.pki.sandbox.threddid.com/root-ca.pem
Issuing	https://crl.pki.sandbox.threddid.com/issuer-ca.pem

The following are the Production Certificates

Certificate Type	URL
Root	https://crl.pki.threddid.com/root-ca.pem
Issuing	https://crl.pki.threddid.com/issuer-ca.pem

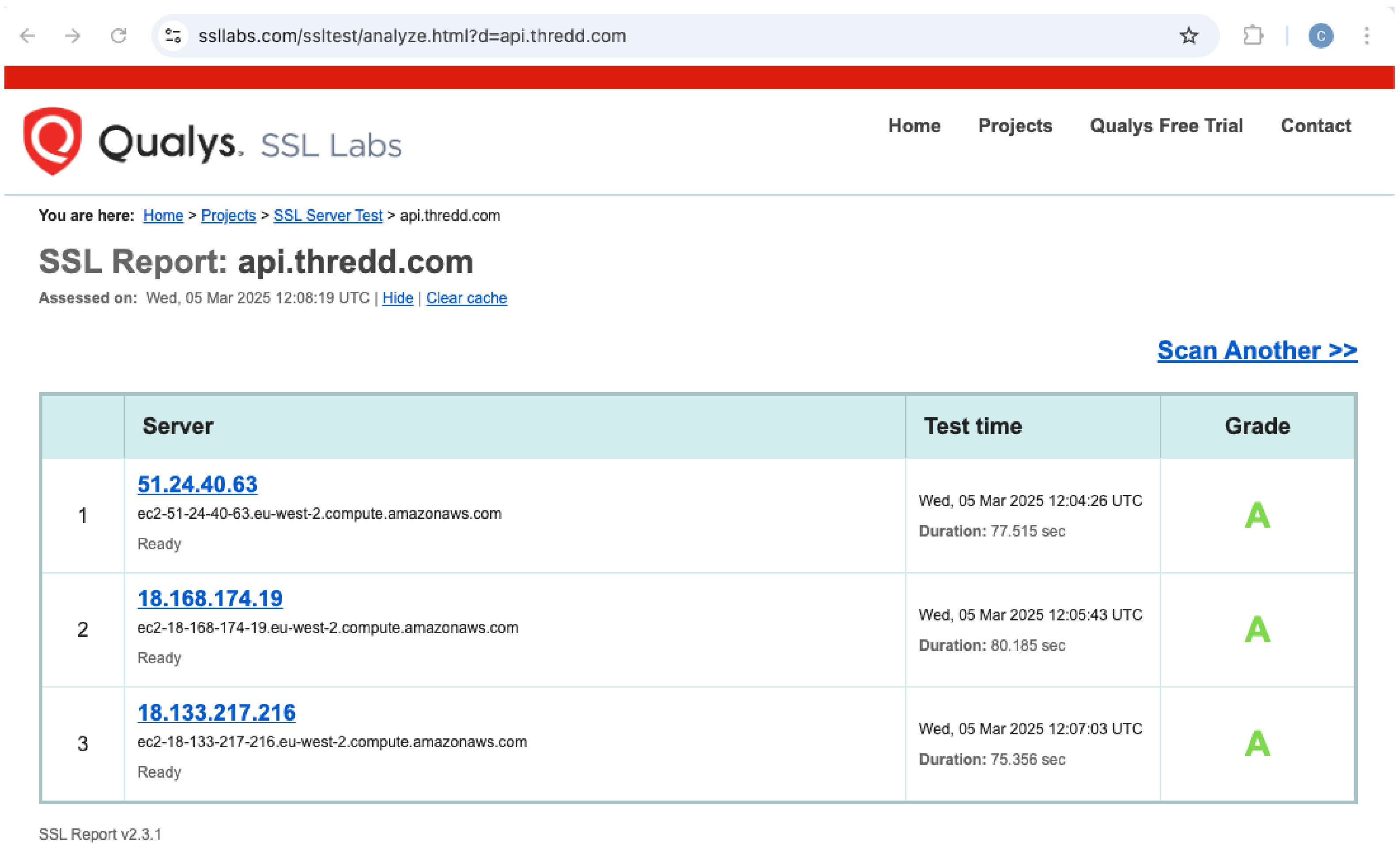
4.1.4 Testing the EHI Endpoint

Once you have set up your EHI endpoint with mTLS, you should test the endpoint with the online SSLLabs tool and OpenSSL. This is to ensure that you can successfully communicate with EHI over mTLS. Once you have completed testing, provide the EHI endpoint to Thredd.

Note: You **must** not provide the EHI endpoint if you have not completed testing.

Test Using SSLLabs

1. Go to the URL of the tool: https://www.ssllabs.com/ssltest/.
2. Enter the URL to be tested in the SSL Labs test screen test page. The results appear similar to the following:



You are here: Home > Projects > SSL Server Test > api.thredd.com

SSL Report: api.thredd.com

Assessed on: Wed, 05 Mar 2025 12:08:19 UTC | Hide | Clear cache

	Server	Test time	Grade
1	51.24.40.63 ec2-51-24-40-63.eu-west-2.compute.amazonaws.com Ready	Wed, 05 Mar 2025 12:04:26 UTC Duration: 77.515 sec	A
2	18.168.174.19 ec2-18-168-174-19.eu-west-2.compute.amazonaws.com Ready	Wed, 05 Mar 2025 12:05:43 UTC Duration: 80.185 sec	A
3	18.133.217.216 ec2-18-133-217-216.eu-west-2.compute.amazonaws.com Ready	Wed, 05 Mar 2025 12:07:03 UTC Duration: 75.356 sec	A

SSL Report v2.3.1

Figure 8: Passing Tests on SSL Labs

An “A” Grade results in the test passing. However, “B” will not result in a pass, and can indicate that the problem is due to a missing an Immediate or Root certificate on your server.

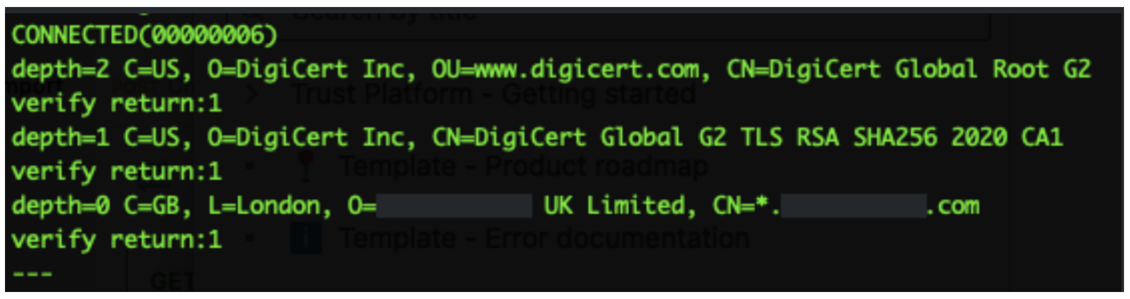
Test Using OpenSSL

You run the following command that triggers the TLS Handshake for the communication between server and the client. You receive responses for the server and client certificates.

```
openssl s_client -connect ehi.yourdomain.com:443
```

Server Certificate Result

The results for the server certificate appears as follows:



```
CONNECTED(00000006)
depth=2 C=US, O=DigiCert Inc, OU=www.digicert.com, CN=DigiCert Global Root G2
verify return:1
depth=1 C=US, O=DigiCert Inc, CN=DigiCert Global G2 TLS RSA SHA256 2020 CA1
verify return:1
depth=0 C=GB, L=London, O=[redacted] UK Limited, CN=*.[redacted].com
verify return:1
---
```

Figure 9: Server Certificate Result Including Depth Settings

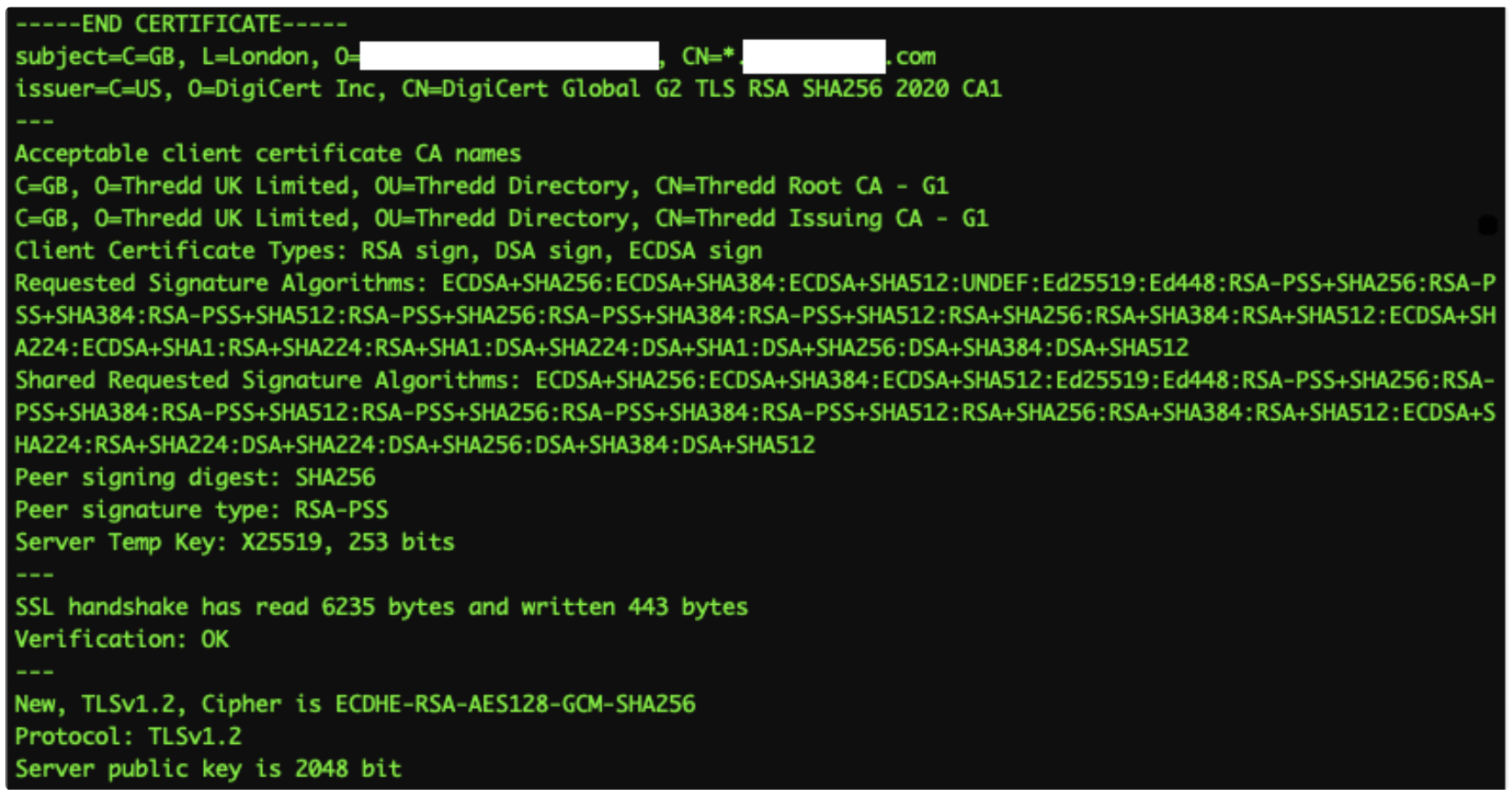
If `Depth 0,1,2` all show `verify return:1` this indicates that the EHI servers trust the TLS endpoint / Server Certificate. There could be an issue with server certificate result, if the results appear differently, for example, there is no `verify return:1` for the depth settings. The Depth settings mean the following:

Depth Setting	Description
Depth 0 = Root	The Root certificate has been sent
Depth 1 = Intermediate:	The Leaf certificate has been sent.
Depth 2= Root:	The Root certificate has been sent.

You should configure your server's TLS setup so that it sends the Server Certificate and the Intermediate Certificate. If the server sends only the Server certificate the Chain of Trust is not complete, which results in the mTLS not being set up between the server and the client.

Client Certificate Result

For validating the Client Certificate, certificates used by Thredd appear under `Acceptable client certificate CA names`. An issue may exist if the `Acceptable client certificate CA names` section is empty, where there Thredd's CAs are not listed.



```
-----END CERTIFICATE-----
subject=C=GB, L=London, O=[redacted], CN=*.[redacted].com
issuer=C=US, O=DigiCert Inc, CN=DigiCert Global G2 TLS RSA SHA256 2020 CA1
---
Acceptable client certificate CA names
C=GB, O=Thredd UK Limited, OU=Thredd Directory, CN=Thredd Root CA - G1
C=GB, O=Thredd UK Limited, OU=Thredd Directory, CN=Thredd Issuing CA - G1
Client Certificate Types: RSA sign, DSA sign, ECDSA sign
Requested Signature Algorithms: ECDSA+SHA256:ECDSA+SHA384:ECDSA+SHA512:UNDEF:Ed25519:Ed448:RSA-PSS+SHA256:RSA-P
SS+SHA384:RSA-PSS+SHA512:RSA-PSS+SHA256:RSA-PSS+SHA384:RSA-PSS+SHA512:RSA+SHA256:RSA+SHA384:RSA+SHA512:ECDSA+SH
A224:ECDSA+SHA1:RSA+SHA224:RSA+SHA1:DSA+SHA224:DSA+SHA1:DSA+SHA256:DSA+SHA384:DSA+SHA512
Shared Requested Signature Algorithms: ECDSA+SHA256:ECDSA+SHA384:ECDSA+SHA512:Ed25519:Ed448:RSA-PSS+SHA256:RSA-
PSS+SHA384:RSA-PSS+SHA512:RSA-PSS+SHA256:RSA-PSS+SHA384:RSA-PSS+SHA512:RSA+SHA256:RSA+SHA384:RSA+SHA512:ECDSA+S
HA224:RSA+SHA224:DSA+SHA224:DSA+SHA256:DSA+SHA384:DSA+SHA512
Peer signing digest: SHA256
Peer signature type: RSA-PSS
Server Temp Key: X25519, 253 bits
---
SSL handshake has read 6235 bytes and written 443 bytes
Verification: OK
---
New, TLSv1.2, Cipher is ECDHE-RSA-AES128-GCM-SHA256
Protocol: TLSv1.2
Server public key is 2048 bit
```

Figure 10: Client Certificate Response

Note: Listing the CA authority is optional. If this is empty, it may not mean that the mutual part of the certificate validation has failed.

Note: You may need to check the EHI listener endpoint configuration if the following has occurred:

- If the SSLLabs test does not give an A Grade Response
- the Server Certificate does not show verify return:1 at all depths
- the Acceptable client certificate CA names are not sent

Testing Requests Without a Certificate

For additional testing, you can test a request to the EHI endpoint that does not contain a certificate. Using cURL, you see a 400 or 403 response as in the following example.

```
# Request
curl -v https://api.yourdomain.com/ehim/endpoint/api
# Partial Response
<html>
<head><title>400 No required SSL certificate was sent</title></head>
<body>
<center><h1>400 Bad Request</h1></center>
<center>No required SSL certificate was sent</center>
```

Testing Requests With a Certificate

You can also test a request to the EHI endpoint that contains a certificate. Using cURL, you see a 200 response as in the following example.

```
# Request
curl --cert ./exampleClientCert.pem --key ./exampleClientCert.key \
     -X POST \
     -H "Content-Type: application/json" \
     -d '{"foo": "bar"}' \
     -v https://api.yourdomain.com/ehim/endpoint/api
# Partial Response
200 OK
```

4.1.5 Message Architecture Between Thredd and the Customer EHI

The following shows the message architecture between Thredd and Thredd and your EHI components (the EHI Customer). The EHI listener endpoint and the mTLS termination point are part of your EHI components.

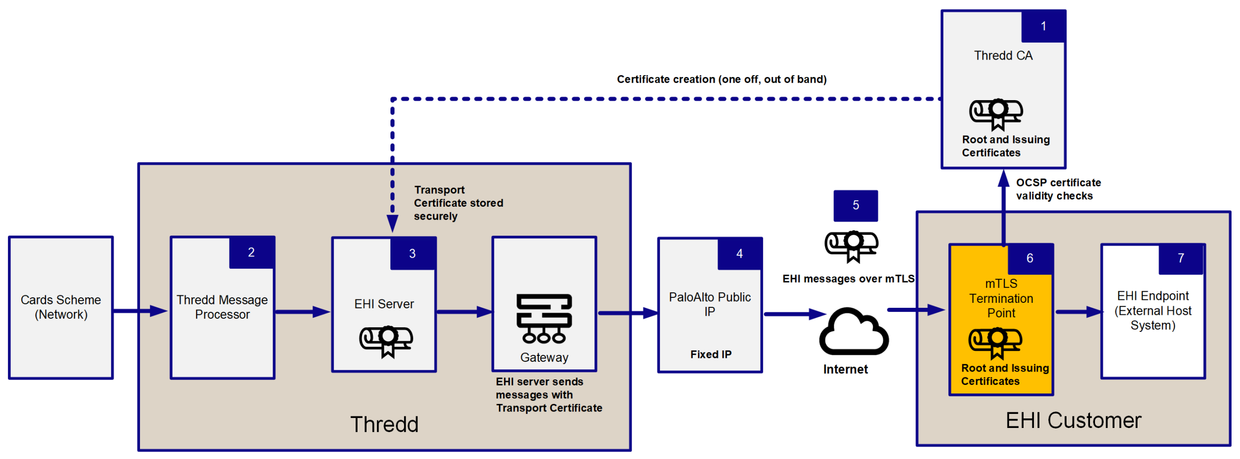

1
Thredd CA
Root and Issuing Certificates
Certificate creation (one off, out of band)
Transport Certificate stored securely
OCSP certificate validity checks
Cards Scheme (Network)
2
Thredd Message Processor
3
EHI Server
Gateway
EHI server sends messages with Transport Certificate
Thredd
4
PaloAlto Public IP
Fixed IP
5
EHI messages over mTLS
Internet
6
mTLS Termination Point
Root and Issuing Certificates
7
EHI Endpoint (External Host System)
EHI Customer

Figure 11: Message Architecture Between Thredd and EHI

1. Thredd uses the *Certificate Authority*, Thredd Certificate Authority, to create a Transport Certificate to enable communication later over mTLS.
2. Thredd's Message Processor sends and processes EHI messages that are received from the Cards Schemes (Networks) to Thredd's EHI servers.
3. Thredd sends the EHI messages via a gateway and adds the Transport Certificate.
4. EHI requests travel across the Internet with the associated Transport Certificate attached. Note that Thredd's outgoing firewall has a fixed IP address.
5. The Transport Certificate is presented to the customer's incoming mTLS termination point during the connection handshake.
6. Your systems validate the Transport Certificate by checking it against the CA chain of trust (Root and Issuing Certificates).
7. When the mTLS handshake is complete, you receive EHI messages on your EHI endpoint (External Host System).

4.1.6 Adding Security Controls

You can choose to implement additional optional controls to enhance mTLS security. These include the:

- **IP Address Allow List** – Thredd EHI messages are sent from a firewall with a fixed IP. Optionally, you can add this IP to your Allow List.
- **Certificate Pinning** – Whilst our mutual communication is secured by our Transport Certificate which is only trusted if it has been issued by our CA, you can choose to also implement Certificate Pinning. Certificate Pinning blocks attempted requests made with the incorrect certificates. For more information, see Certificate and Public Key Pinning | OWASP Foundation.

Section 5: Other Thredd Applications

You should read this section to understand the setup steps for other Thredd applications, including Smart Client and Thredd Portal.

Topics covered in this section:

- Smart Client and CTS
- Thredd Portal

5.1 Connecting to Smart Client and CTS

5.1.1 Smart Client Installation

Complete the following steps to connect to Smart Client:

1. Ensure the laptop you are using has an internet connection.
2. Go to a Thredd-hosted page for downloading the Smart Client (SC) installer.
3. Run the install program.

For UAT, the download links are:

- Smart Client (card processor) - https://sc-uat.thredd.net/
- Pan Finder - https://pf-uat.thredd.net/

5.1.2 CTS Access

CTS can be accessed online. CTS users can use the same credentials as are used to access Smart Client in UAT (provided that CTS has been enabled).

You can access CTS at the following link: https://cts-uat.globalprocessing.net:54340/

5.2 Connecting to Thredd Portal

You must first be set up on Cloudentity before you can access Thredd Portal.

Thredd Portal functions as a *Confidential Client*, where Thredd’s own application infrastructure undertakes authentication and authorisation activity on behalf of the user.

The following is a summary of steps we run:

- Thredd adds an Admin user for your organisation to Cloudentity.
- We help to set up Single Sign-On SSO with your organisation.

Your Admin user is then able to perform the following:

- Add an organisation and assign roles to the organisation.
- Add Thredd Portal users to Cloudentity.
- Add roles in Cloudentity.

For more details, refer to the Thredd Portal Guide: Getting Started.

Section 6: Appendices

You should read this section to understand the setup steps for EHI.

Topics covered in this section:

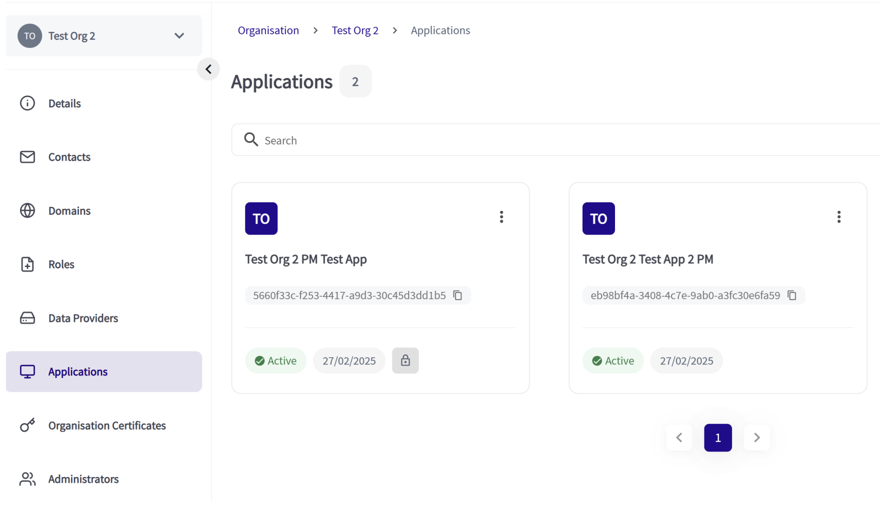
6.1 Generating and Obtaining a Software Statement Assertion (SSA)

This page describes how to generate and obtain an SSA. An SSA is a signed JWT token with information about the Application that is presented to Cloudentity when performing DCR (the last step before accessing the REST APIs). You first need to generate an SSA in the Thredd CA dashboard. Once generated, you can obtain the SSA, either through Postman, or though an API-based method for connecting to Thredd CA (as described on this page.) For details of the steps in Postman refer to Accessing the Cards API with mTLS.

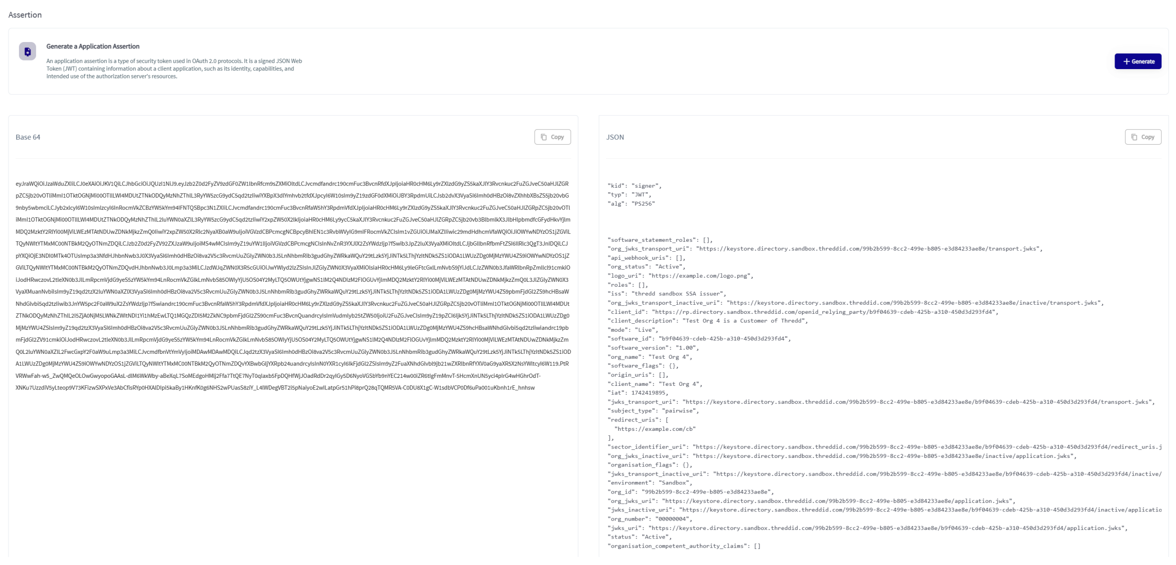
6.1.1 Generating an SSA in Thredd CA

You can generate an SSA for your Application under the **Applications > Application Assertion** section for your Organisation.

1. From the list of Organisations, click on the relevant tile.
2. Click **Applications**.



3. Select the Application that you want to generate an assertion for under **Applications**.
4. Click the **Assertion** tab.
5. Click the **Generate** button. A message appears followed by the Assertion.



Generate a Application Assertion

An application assertion is a type of security token used in OAuth 2.0 protocols. It is a signed JSON Web Token (JWT) containing information about a client application, such as its identity, capabilities, and intended use of the authorization server's resources.

```
eyJraWQiOiJzaWduZXIiLCJ0eXAiOiJKV1QiLCJhbGciOiJQUzI1NiJ9.eyJzb2Z0d2FyZV9zdGF0ZW1lbnRfcm9sZXMiOltdLCJvcmdfandrc190cmFuc3BvcnRfdXJpIjoiaHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGR
pZC5jb20vOTliMmI1OTktOGNjMi00OTllLWI4MDUtZTNkODQyMzNhZThlL3RyYW5zcG9ydC5qd2tzIiwiYXBpX3dlYmhvb2tfdXJpcyI6W10sIm9yZ19zdGF0dXMiOiJBY3RpdmUiLCJsb2dvX3VyaSI6Imh0dHBzOi8vZXhhbXBsZS5jb20vbG
9nby5wbmciLCJyb2xlcyI6W10sImlzcyI6InRocmVkZCBzYW5kYm94IFNTQSBpc3N1ZXIiLCJvcmdfandrc190cmFuc3BvcnRfaW5hY3RpdmVfdXJpIjoiaHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vOTl
iMmI1OTktOGNjMi00OTllLWI4MDUtZTNkODQyMzNhZThlL2luYWN0aXZlL3RyYW5zcG9ydC5qd2tzIiwiY2xpZW50X2lkIjoiaHR0cHM6Ly9ycC5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vb3BlbmlkX3JlbHlpbmdfcGFydHkvYjlm
MDQ2MzktY2RlYi00MjViLWEzMTAtNDUwZDNkMjkzZmQ0IiwiY2xpZW50X2Rlc2NyaXB0aW9uIjoiVGVzdCBPcmcgNCBpcyBhIEN1c3RvbWVyIG9mIFRocmVkZCIsIm1vZGUiOiJMaXZlIiwic29mdHdhcmVfaWQiOiJiOWYwNDYzOS1jZGViL
TQyNWItYTMxMC00NTBkM2QyOTNmZDQiLCJzb2Z0d2FyZV92ZXJzaW9uIjoiMS4wMCIsIm9yZ19uYW1lIjoiVGVzdCBPcmcgNCIsInNvZnR3YXJlX2ZsYWdzIjp7fSwib3JpZ2luX3VyaXMiOltdLCJjbGllbnRfbmFtZSI6IlRlc3QgT3JnIDQiLCJ
pYXQiOjE3NDI0MTk4OTUsImp3a3NfdHJhbnNwb3J0X3VyaSI6Imh0dHBzOi8va2V5c3RvcmUuZGlyZWN0b3J5LnNhbmRib3gudGhyZWRkaWQuY29tLzk5YjJiNTk5LThjYzItNDk5ZS1iODA1LWUzZDg0MjMzYWU4ZS9iOWYwNDYzOS1jZ
GViLTQyNWItYTMxMC00NTBkM2QyOTNmZDQvdHJhbnNwb3J0Lmp3a3MiLCJzdWJqZWN0X3R5cGUiOiJwYWlyd2lzZSIsInJlZGlyZWN0X3VyaXMiOlsiaHR0cHM6Ly9leGFtcGxlLmNvbS9jYiJdLCJzZWN0b3JfaWRlbnRpZmllcl91cmkiO
iJodHRwczovL2tleXN0b3JlLmRpcmVjdG9yeS5zYW5kYm94LnRocmVkZGlkLmNvbS85OWIyYjU5OS04Y2MyLTQ5OWUtYjgwNS1lM2Q4NDIzM2FlOGUvYjlmMDQ2MzktY2RlYi00MjViLWEzMTAtNDUwZDNkMjkzZmQ0L3JlZGlyZWN0X3
VyaXMuanNvbiIsIm9yZ19qd2tzX2luYWN0aXZlX3VyaSI6Imh0dHBzOi8va2V5c3RvcmUuZGlyZWN0b3J5LnNhbmRib3gudGhyZWRkaWQuY29tLzk5YjJiNTk5LThjYzItNDk5ZS1iODA1LWUzZDg0MjMzYWU4ZS9pbmFjdGl2ZS9hcHBsaW
NhdGlvbi5qd2tzIiwib3JnYW5pc2F0aW9uX2ZsYWdzIjp7fSwiandrc190cmFuc3BvcnRfaW5hY3RpdmVfdXJpIjoiaHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vOTliMmI1OTktOGNjMi00OTllLWI4MDUt
ZTNkODQyMzNhZThlL2I5ZjA0NjM5LWNkZWItNDI1Yi1hMzEwLTQ1MGQzZDI5M2ZkNC9pbmFjdGl2ZS90cmFuc3BvcnQuandrcyIsImVudmlyb25tZW50IjoiU2FuZGJveCIsIm9yZ19pZCI6Ijk5YjJiNTk5LThjYzItNDk5ZS1iODA1LWUzZDg0
MjMzYWU4ZSIsIm9yZ19qd2tzX3VyaSI6Imh0dHBzOi8va2V5c3RvcmUuZGlyZWN0b3J5LnNhbmRib3gudGhyZWRkaWQuY29tLzk5YjJiNTk5LThjYzItNDk5ZS1iODA1LWUzZDg0MjMzYWU4ZS9hcHBsaWNhdGlvbi5qd2tzIiwiandrc19pb
mFjdGl2ZV91cmkiOiJodHRwczovL2tleXN0b3JlLmRpcmVjdG9yeS5zYW5kYm94LnRocmVkZGlkLmNvbS85OWIyYjU5OS04Y2MyLTQ5OWUtYjgwNS1lM2Q4NDIzM2FlOGUvYjlmMDQ2MzktY2RlYi00MjViLWEzMTAtNDUwZDNkMjkzZm
Q0L2luYWN0aXZlL2FwcGxpY2F0aW9uLmp3a3MiLCJvcmdfbnVtYmVyIjoiMDAwMDAwMDQiLCJqd2tzX3VyaSI6Imh0dHBzOi8va2V5c3RvcmUuZGlyZWN0b3J5LnNhbmRib3gudGhyZWRkaWQuY29tLzk5YjJiNTk5LThjYzItNDk5ZS1iOD
A1LWUzZDg0MjMzYWU4ZS9iOWYwNDYzOS1jZGViLTQyNWItYTMxMC00NTBkM2QyOTNmZDQvYXBwbGljYXRpb24uandrcyIsInN0YXR1cyI6IkFjdGl2ZSIsIm9yZ2FuaXNhdGlvbl9jb21wZXRlbnRfYXV0aG9yaXR5X2NsYWltcyI6W119.PtR
VRWwFah-w5_ZwQMQeOLOwGwyopoGAAsL-dIM6WkWby-aBeXqL7SoMEdgoHMlj2Ffa7TtQE7NyT0qlaxb5FpDQHfWjJOadRdDr2qylGy5D6NyoVGSbYb9nYEC214w00iZR6tIgFmMnvT-5HcmXnUN5yci4pIrG4wHGhrOdT-
XNKu7UzzdiV5yLteop9V73KFizwSXPxVe3AbCfisRYp0HXAlDIpi5kaBy1HKnfK0g6NHS2wPUasS8ziY_L4lWDegVBT2i5pNaiyoE2wlLatpGr51hPi8prQ28qTQMR5VA-C0DU8X1gC-W1sdbVCP0Df6uPa001uKbnh1rE_hnhsw
```

```
"kid": "signer",
"typ": "JWT",
"alg": "PS256"


"software_statement_roles": [],
"org_jwks_transport_uri": "https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/transport.jwks",
"api_webhook_uris": [],
"org_status": "Active",
"logo_uri": "https://example.com/logo.png",
"roles": [],
"iss": "thredd sandbox SSA issuer",
"org_jwks_transport_inactive_uri": "https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/inactive/transport.jwks",
"client_id": "https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4",
"client_description": "Test Org 4 is a Customer of Thredd",
"mode": "Live",
"software_id": "b9f04639-cdeb-425b-a310-450d3d293fd4",
"software_version": "1.00",
"org_name": "Test Org 4",
"software_flags": {},
"origin_uris": [],
"client_name": "Test Org 4",
"iat": 1742419895,
"jwks_transport_uri": "https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/b9f04639-cdeb-425b-a310-450d3d293fd4/transport.jwks",
"subject_type": "pairwise",
"redirect_uris": [
  "https://example.com/cb"
],
"sector_identifier_uri": "https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/b9f04639-cdeb-425b-a310-450d3d293fd4/redirect_uris.j
"org_jwks_inactive_uri": "https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/inactive/application.jwks",
"organisation_flags": {},
"jwks_transport_inactive_uri": "https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/b9f04639-cdeb-425b-a310-450d3d293fd4/inactive/
"environment": "Sandbox",
"org_id": "99b2b599-8cc2-499e-b805-e3d84233ae8e",
"org_jwks_uri": "https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/application.jwks",
"jwks_inactive_uri": "https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/b9f04639-cdeb-425b-a310-450d3d293fd4/inactive/applicatio
"org_number": "00000004",
"jwks_uri": "https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/b9f04639-cdeb-425b-a310-450d3d293fd4/application.jwks",
"status": "Active",
"organisation_competent_authority_claims": []
```

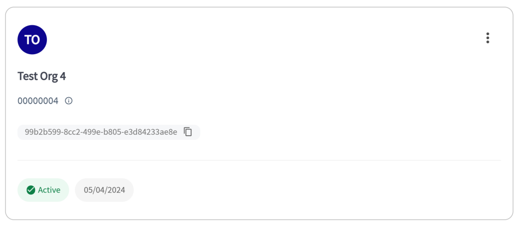
6.1.2 Obtaining an SSA Using API Calls

You can use API calls from outside of Thredd CA in order to request the SSA, which you generated on Thredd CA. This includes the command for acquiring an access token for connecting to Thredd CA, and the command for requesting an SSA. The command for acquiring an access token executes a Client Credentials Grant, which initiates a request to Thredd CA over mTLS. You need to have also created a Transport Certificate for accessing Thredd CA (refer to Creating Client Application Certificates for REST APIs for more details). You will need to prepare the Client ID and the SSA details.

Preparing the Client ID Details

You will need to get the client_id URL which includes the URL of Thredd CA and the Client ID. The following is an example: client_id=https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4.. You can find the Client ID from the Organisations page in Thredd CA.

1. Log in to Thredd CA using these links:
    - Sandbox: https://web.directory.sandbox.threddid.com/
    - Production: https://web.directory.threddid.com/
2. In the Sign-in screen, enter your registered email address and click CloudEntity SSO.
3. Locate the organisation tile and copy the Client ID.


TO

Test Org 4

00000004

99b2b599-8cc2-499e-b805-e3d84233ae8e

Active 05/04/2024

Preparing SSA Details

You need to prepare details of the SSA for the SSA URL. The following is an example: client_id=https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4. This includes the:

- **{{rc_mtls_base_url}}:** This is the variable for the Base URL for Thredd CA.
- **{{org_id}}** The Organisation ID.
- **SSA ID** This is the ID of the SSA, which is the same as the Application ID.

Entering Commands to Obtain an SSA

Enter the following command for acquiring an access token. This include the Thredd CA URL in location.

```
curl --location 'https://matls-auth.directory.sandbox.threddid.com/token' \
                --header 'Content-Type: application/x-www-form-urlencoded' \
                --data-urlencode 'scope=directory:software' \
                --data-urlencode 'client_id=https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-
a310-450d3d293fd4' \
                --data-urlencode 'grant_type=client_credentials'
```

Type in the following command to request an SSA. This includes the SSA URL.

```
curl --location 'https://matls-auth.directory.sandbox.threddid.com//organisations/99b2b599-8cc2-499e-b805-e3d84233ae8e/soft-
warestatements/b9f04639-cdeb
                -425b-a310-450d3d293fd4/assertion' \
            --header 'Authorization: Bearer <access_token>'
```

The response you see is as follows. This includes the SSA in Base 64 format and the metadata associated with the SSA.

```
{
  "client_name":"Test Org 4",
  "description":"",
  "client_uri":"",
  "logo_uri":"https://example.com/logo.png",
  "policy_uri":"",
  "tos_uri":"",
  "organisation_id":"",
  "client_id":"https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4",
  "application_type":"service",
  "application_types":[
    "service",
    "dcr"
  ],
  "redirect_uris":[
    "https://example.com/cb"
  ],
  "grant_types":[
    "client_credentials"
  ],
  "response_types":[
    "token"
  ],
  "scope":"3ds.read bulkcard.read bulkcard.write cards.encrypted cards.read cards.sensitive cards.write cvv.read cvv.write digit-
alchannel fraud.read fraud.write internal.read internal.write issuer.read issuer.write pin.read pin.write",
  "scopes":[
    "3ds.read",
    "bulkcard.read",
    "bulkcard.write",
    "cards.encrypted",
    "cards.read",
    "cards.sensitive",
    "cards.write",
    "cvv.read",
    "cvv.write",
    "digitalchannel",
    "fraud.read",
    "fraud.write",
    "internal.read",
    "internal.write",
    "issuer.read",
    "issuer.write",
    "pin.read",
    "pin.write"
  ],
  "audience":[
    "https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4"
  ],
  "token_endpoint_auth_method":"private_key_jwt",
  "revocation_endpoint_auth_method":"private_key_jwt",
  "introspection_endpoint_auth_method":"private_key_jwt",
  "token_exchange":{
    "actor_claims":null
  },
  "token_endpoint_auth_signing_alg":"",
  "jwks":{
    "keys":[

    ]
  },
  "jwks_uri":"https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/b9f04639-cdeb-425b-a310-
450d3d293fd4/application.jwks",
  "request_object_signing_alg":"RS256",
  "request_object_encryption_alg":"",
  "request_object_encryption_enc":"",
  "request_uris":[

  ],
  "client_id_issued_at":1723556609,
  "created_at":"2024-08-13T13:43:29.619067912Z",
  "updated_at":"2024-08-13T13:43:29.619067912Z",
  "client_secret_expires_at":0,
  "sector_identifier_uri":"https://keystore.directory.sandbox.threddid.com/99b2b599-8cc2-499e-b805-e3d84233ae8e/b9f04639-cdeb-
425b-a310-450d3d293fd4/redirect_uris.json",
  "userinfo_signed_response_alg":"none",
  "id_token_signed_response_alg":"ES256",
  "id_token_encrypted_response_alg":"",
  "id_token_encrypted_response_enc":"",
  "tls_client_certificate_bound_access_tokens":true,
  "tls_client_auth_subject_dn":"",
  "tls_client_auth_san_dns":"",
  "tls_client_auth_san_uri":"",
  "tls_client_auth_san_ip":"",
  "tls_client_auth_san_email":"",
  "privacy":{
    "scopes":null
  },
  "subject_type":"pairwise",
  "backchannel_token_delivery_mode":"",
  "backchannel_client_notification_endpoint":"",
  "backchannel_authentication_request_signing_alg":"",
  "backchannel_user_code_parameter":false,
  "require_pushed_authorization_requests":false,
  "authorization_signed_response_alg":"ES256",
  "authorization_encrypted_response_alg":"",
  "authorization_encrypted_response_enc":"",
  "dpop_bound_access_tokens":false,
  "authorization_details_types":null,
  "post_logout_redirect_uris":[

  ],
  "app_url":"",
  "backchannel_logout_uri":"",
  "backchannel_logout_session_required":false,
  "client_secret":"xT4SDSlIp9J3aLMIHMtQ99Uok6onqaQJEiQ0Hp2QBXc",
  "hashed_secret":"c2d-
c89f-
d3581d6222a7a143f173a4696feee7773f4156ada52c241eea25b30990f-
b35f2-
faa42105f1e51895d-
d7ced75f0847659f6396f-
bc977cf71d73-
bef7a1a7f93830e871ae9f-
b767318b0c545ee9543dc8ae94044cfc8a9b26bcf8bad53e3ba00ef889d1d8338dfdbdedd1aed382b51a86cf5f08d21d4cbf6f23d66141c50",
  "software_id":"b9f04639-cdeb-425b-a310-450d3d293fd4",
  "software_version":"1.00",
  "software_statement":"eyJraWQiOiJz-
aWduZXIiLCJ0eXAiOiJKV1QiLCJh-
bGciOiJQUzI1NiJ9.eyJzb2Z0d2FyZV9zdGF0ZW1lb-
nRfcm9sZXMiOlt-
dLCJvcm-
dfandrc190cmFuc3BvcnRf-
dXJpI-
joi-
aHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vOTliMmI1OTk-
tOGNjMi00OTllLWI4MDUtZTNkODQyMzNhZThlL3RyYW5zcG9y-
dC5qd2tzIi-
wiYXBpX3dlYm-
hvb2t-
fdXJp-
cyI6W10sIm9yZ19zdGF0dXMiOiJBY3Rp-
dmUiLCJs-
b2d-
vX3Vy-
aSI6Im-
h0dHBzOi8vZXh-
hbXBsZS5jb20vbG9nby5wbm-
ciLCJy-
b2xl-
cyI6W10sIm-
lzcyI6InRocmVkZCBzYW5kYm94IFNTQSBp-
c3N1ZXIiLCJvcm-
dfandrc190cmFuc3BvcnR-
faW5hY3Rp-
dmVf-
dXJpI-
joi-
aHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vOTliMmI1OTk-
tOGNjMi00OTllLWI4MDUtZTNkODQyMzNhZThlL2luYWN0aXZlL3RyYW5zcG9y-
dC5qd2tzIi-
wiY2x-
pZW50X2lkI-
joi-
aHR0cHM6Ly9ycC5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vb3Bl-
```

```
bmlkX3Jl-
bHlpb-
mdfcGFy-
dHk-
vYjlmMDQ2Mzk-
tY2RlYi00MjViLWEzMTAtNDUwZDNkMjkzZmQ0Ii-
wiY2x-
pZW50X2Rl-
c2Ny-
aXB0aW9uI-
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cgNCBp-
cyBhIEN1c3RvbWVyIG9mIFRocmVkZCIsIm1vZGUiOiJMaXZlIi-
wic29m-
dHd-
hcmV-
faWQiOiJiOWYwNDYzOS1jZGViLTQyNWItYTMxMC00NTBkM2QyOTNmZDQiLCJzb2Z0d2FyZV92ZXJz-
aW9uI-
joiMS4wMCIsIm9yZ19uYW1lI-
joiVGVzdCBPcm-
cgNCIsInNvZnR3YXJlX2ZsYWdzIjp7fSwib3JpZ2luX3Vy-
aXMiOlt-
dLCJjbGllb-
nRf-
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dHJhb-
nNw-
b3J0X3Vy-
aSI6Im-
h0dHBzOi8va2V5c3RvcmUuZGlyZWN0b3J5LnNhb-
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nNw-
b3J0Lm-
p3a3MiLCJvcm-
dhbm-
lzYXRp-
b25f-
dGFncyI6W10sInN1Ym-
plY3Rf-
dHl-
wZSI6InBhaXJ3aXNlIi-
wicmVkaXJlY3Rf-
dXJp-
cyI6WyJodHRw-
czovL2V4YW1w-
bGUuY29tL2NiIl0sInNlY3Rvcl9pZGVudGl-
maWVyX3Vy-
aSI6Im-
h0dHBzOi8va2V5c3RvcmUuZGlyZWN0b3J5LnNhb-
mRib3gudGhyZWRkaWQuY29tLzk5YjJiNTk5LThjYzItNDk5ZS1iODA1LWUzZDg0MjMzYWU4ZS9iOWYwNDYzOS1jZGViLTQyNWItYTMxMC00NTBkM2QyOTNmZDQvcmVkaXJ-
lY3Rf-
dXJpcy5qc29uIi-
wib3JnX2p3a3N-
faW5hY3Rp-
dmVf-
dXJpI-
joi-
aHR0cHM6Ly9rZXlzdG9yZS5kaXJlY3Rvcnkuc2FuZGJveC50aHJlZGRpZC5jb20vOTliMmI1OTk-
tOGNjMi00OTllLWI4MDUtZTNkODQyMzNhZThlL2luYWN0aXZlL2Fw-
cGx-
pY2F0aW9uLm-
p3a3MiLCJvcm-
dhbm-
lzYXRp-
b25fZmx-
hZ3MiOnt9LCJqd2tzX3RyYW5zcG9y-
dF9pb-
mFjdGl2ZV91cmkiOiJodHRw-
czovL2tleXN0b3JlLmRp-
cmVjdG9yeS5zYW5kYm94LnRocmVkZGlkLmNvbS85OWIyYjU5OS04Y2MyLTQ5OWUtYjg-
wNS1lM2Q4NDIzM2FlOGUvYjlmMDQ2Mzk-
```

```
lL2I5ZjA0NjM5LWNkZWItNDI1Yi1hMzEwLTQ1MGQzZDI5M2ZkNC9h-
cHBsaWNhdGlvbi5qd2tzIiwic3RhdHVzIjoiQWN0aXZlIiwib3JnYW5pc2F0aW9uX2NvbXBldGVudF9hdXRob3JpdHlfY2xhaW1zIjpbXX0.N5wPwnVFcramX7BAYOWn_
1tWcLxSRNaIxst-ZK_p29he5mN1_hdFF6BoVMG0Chh-dV_FL4-luQlg7Qn3EMRCb3RWp8U7pcj0lmFSDcUyvlQpoB5hqrXgjPEOkIC7uqJuTDjwakj0NFtJDtK_l_FVp-
PA2ZsDJanwCxsnxxMxVFlxFPwCYk8jBTNE84zx092a4-Tj4VfE4e5S5HA7if8sR7PiXvAMWs1jBrUQ9enWacfu_Xno_-kywtrkAeR4fi-MGNeA4Ik-
bYbh8LyhMjg3XXun87BoL8-b_An5fX5y-XS8VnENg3NFU3D8soQ05OKlXnIDT2Dp7v1lFlNYrV1jO9w",
  "dynamically_registered":true,
  "registration_access_token":"PKW64FAixrjhxewTH9lR26o7m6_GvbL6RKWv0x5mIM.dWPLOrdXw7yGu2R1HAWlx8dSr3Jf-thb_zNFEGSOUNg",
  "registration_client_uri":"https://auth.uat.threddid.com/confidential-cli-
ents/oauth2/register/https://rp.directory.sandbox.threddid.com/openid_relying_party/b9f04639-cdeb-425b-a310-450d3d293fd4",
  "registration_access_token_expires_in":0
}
```

6.2 Configuring SSO with Okta (SAML)

If your organisation uses Okta as an IdP, you can use Okta for configuring SSO for accessing various Thredd services, for example, Thredd Portal. This page describes the steps for using the 2.0 version of Security Assertion Markup Language (SAML) protocol for setting up SSO.

As a client, you would already have an account on the Okta Administration Console.

Note: Setting up SSO is not mandatory, but is recommended.

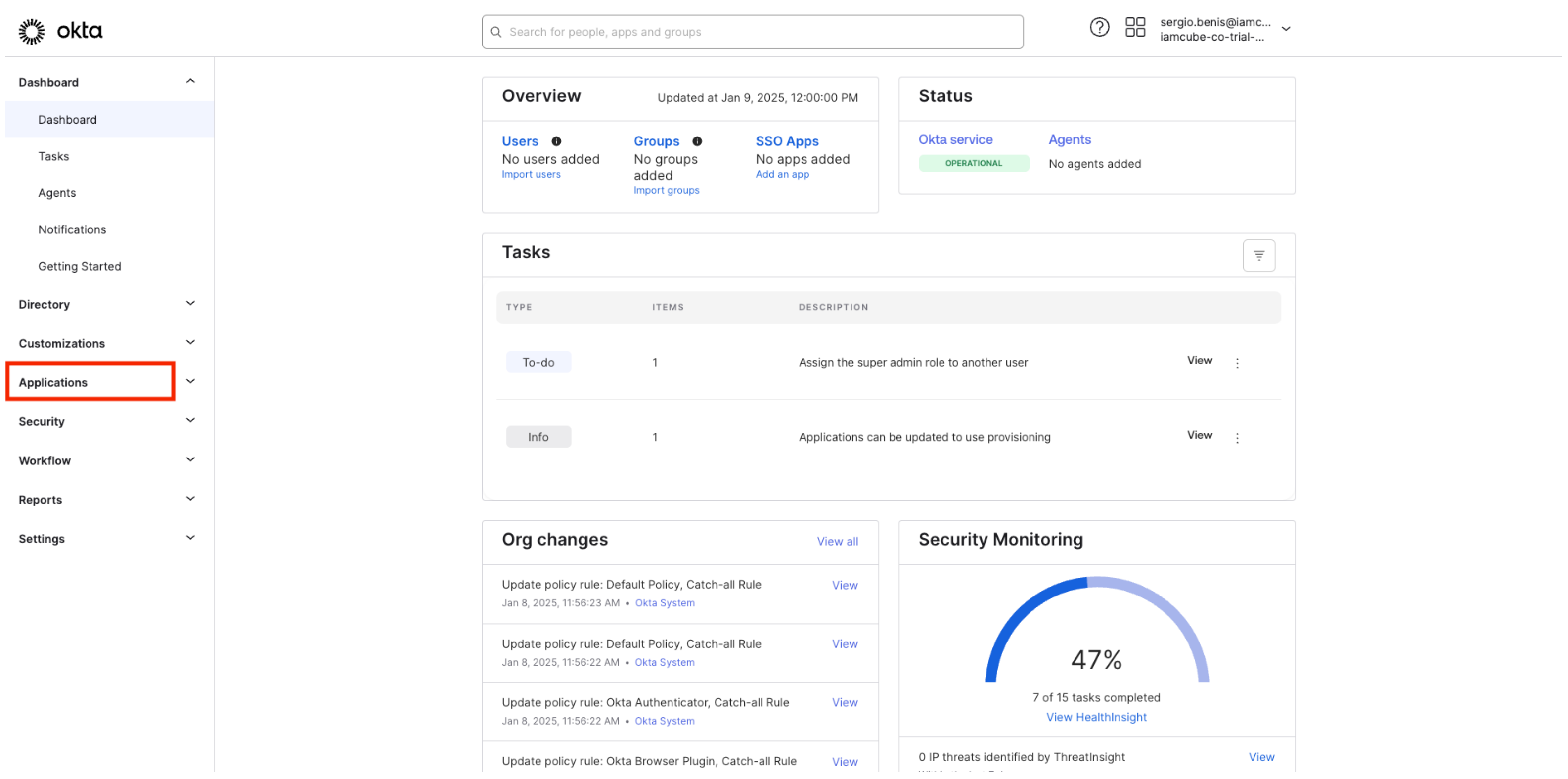
6.2.1 Summary of Steps

The steps involve:

- Creating a SAML app for your SSO connection to Thredd services.
- Adding configurations from Thredd including the SSO URLs and the Entity ID.
- Mapping fields associated with the users defined by Okta with those used by your app.
- Sharing the Metadata URL with Thredd.

6.2.2 Configure SSO

1. Log in to the Okta Administration console.
2. From the left-hand menu, select **Applications**.



Overview Updated at Jan 9, 2025, 12:00:00 PM

Users: No users added (Import users) | Groups: No groups added (Import groups) | SSO Apps: No apps added (Add an app)

Status

Okta service: OPERATIONAL | Agents: No agents added

Tasks

TYPE	ITEMS	DESCRIPTION	
To-do	1	Assign the super admin role to another user	View
Info	1	Applications can be updated to use provisioning	View

Org changes View all

Update policy rule: Default Policy, Catch-all Rule View
Jan 8, 2025, 11:56:23 AM • Okta System

Update policy rule: Default Policy, Catch-all Rule View
Jan 8, 2025, 11:56:22 AM • Okta System

Update policy rule: Okta Authenticator, Catch-all Rule View
Jan 8, 2025, 11:56:22 AM • Okta System

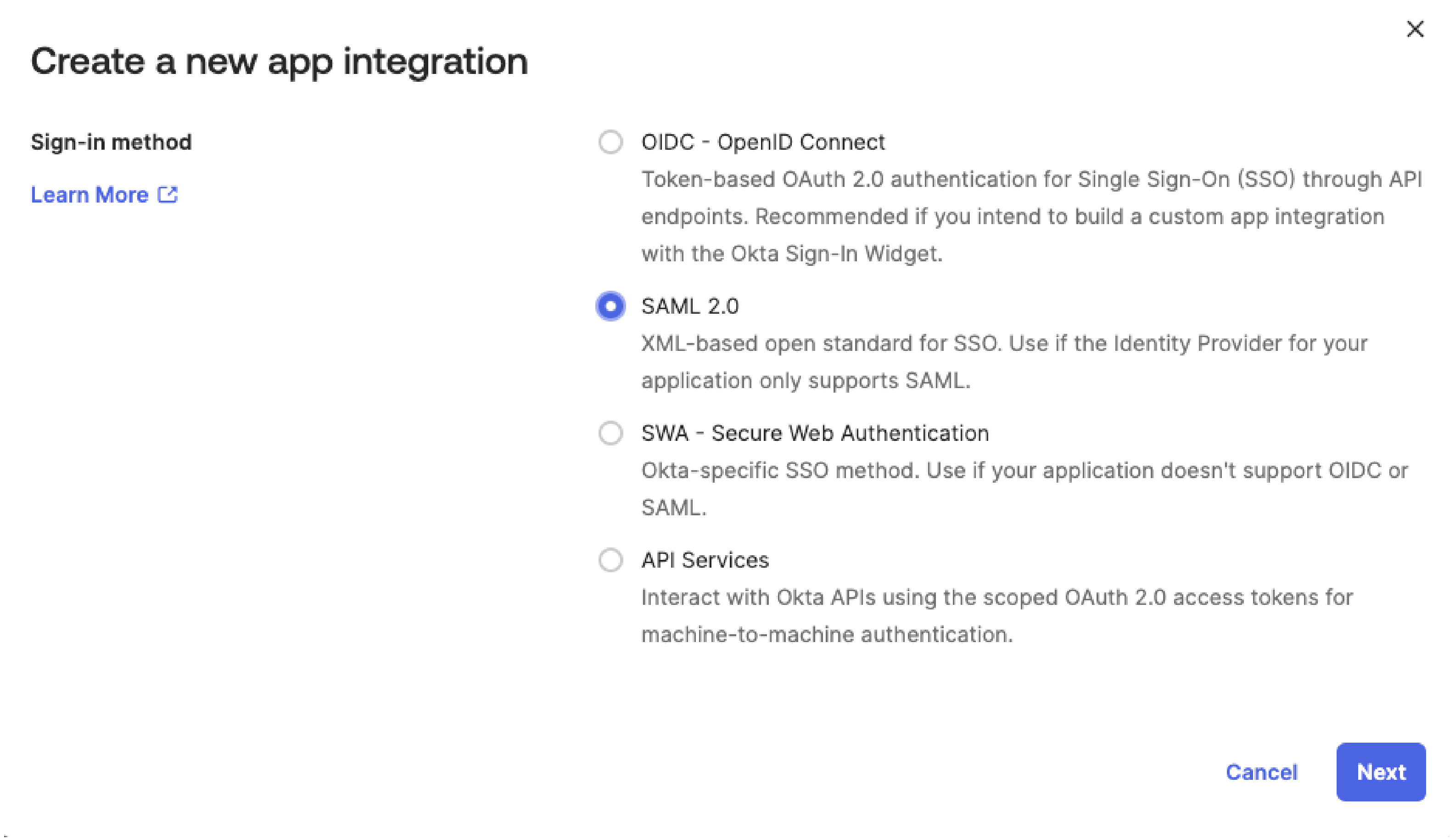
Update policy rule: Okta Browser Plugin, Catch-all Rule View

Security Monitoring

47%
7 of 15 tasks completed
View HealthInsight

0 IP threats identified by ThreatInsight View

3. Click on **Create Application**.
4. Select **SAML 2.0** and click **Next**. The next page appears.


Create a new app integration

Sign-in method

Learn More

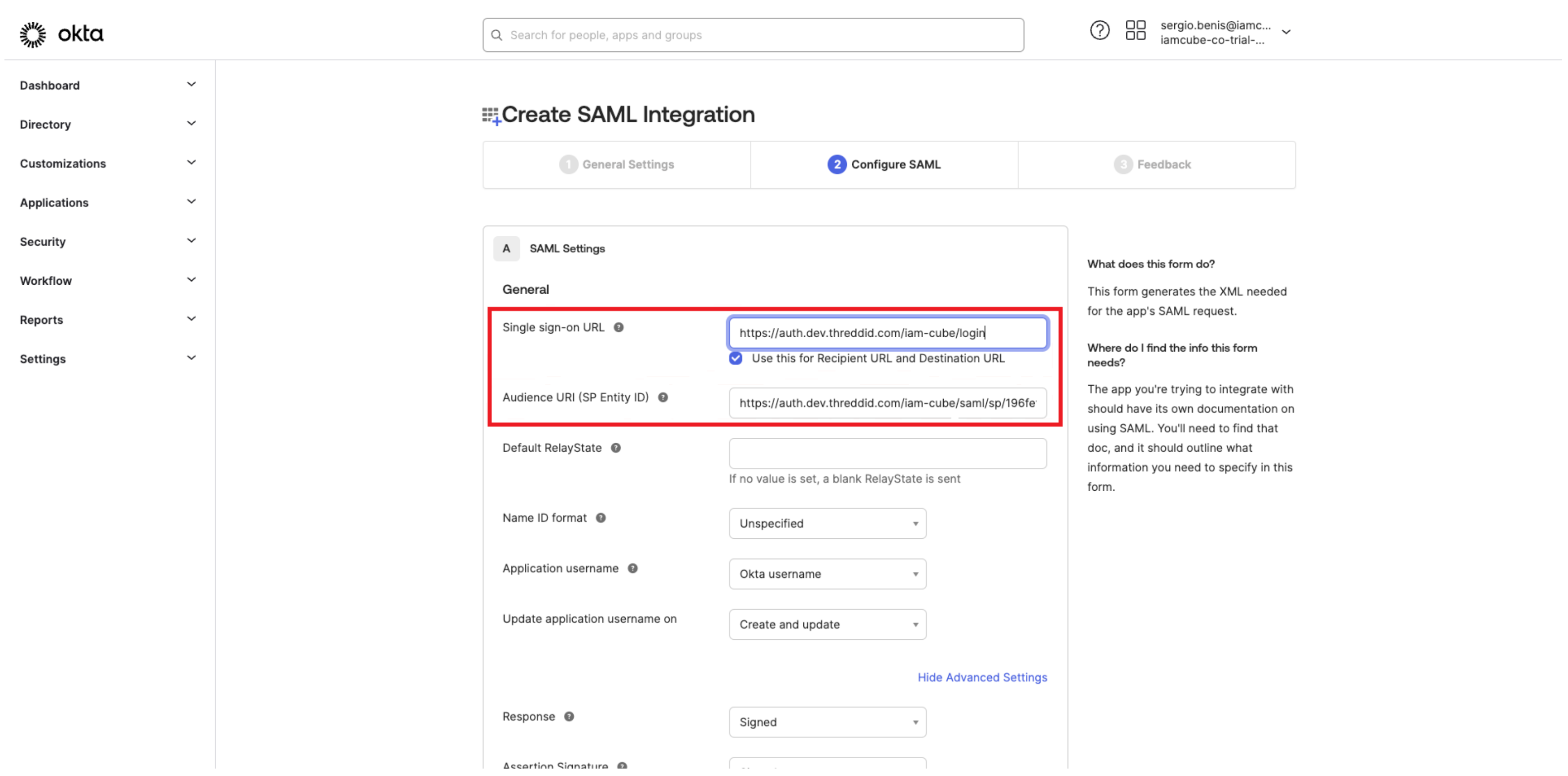
( ) OIDC - OpenID Connect
Token-based OAuth 2.0 authentication for Single Sign-On (SSO) through API endpoints. Recommended if you intend to build a custom app integration with the Okta Sign-In Widget.

(●) SAML 2.0
XML-based open standard for SSO. Use if the Identity Provider for your application only supports SAML.

( ) SWA - Secure Web Authentication
Okta-specific SSO method. Use if your application doesn't support OIDC or SAML.

( ) API Services
Interact with Okta APIs using the scoped OAuth 2.0 access tokens for machine-to-machine authentication.

6. Enter a name for the app that accesses Thredd services in **App name** and click **Next**. The next page appears.
7. Add the provided URLs in **Single Sign-on URL (ACS URL)** and **Audience URL (entity ID)**.



Single sign-on URL: https://auth.dev.threddid.com/iam-cube/login
[✓] Use this for Recipient URL and Destination URL

Audience URI (SP Entity ID): https://auth.dev.threddid.com/iam-cube/saml/sp/196fe

Default RelayState:
If no value is set, a blank RelayState is sent

Name ID format: Unspecified

Application username: Okta username

Update application username on: Create and update

Hide Advanced Settings

Response: Signed

Assertion Signature

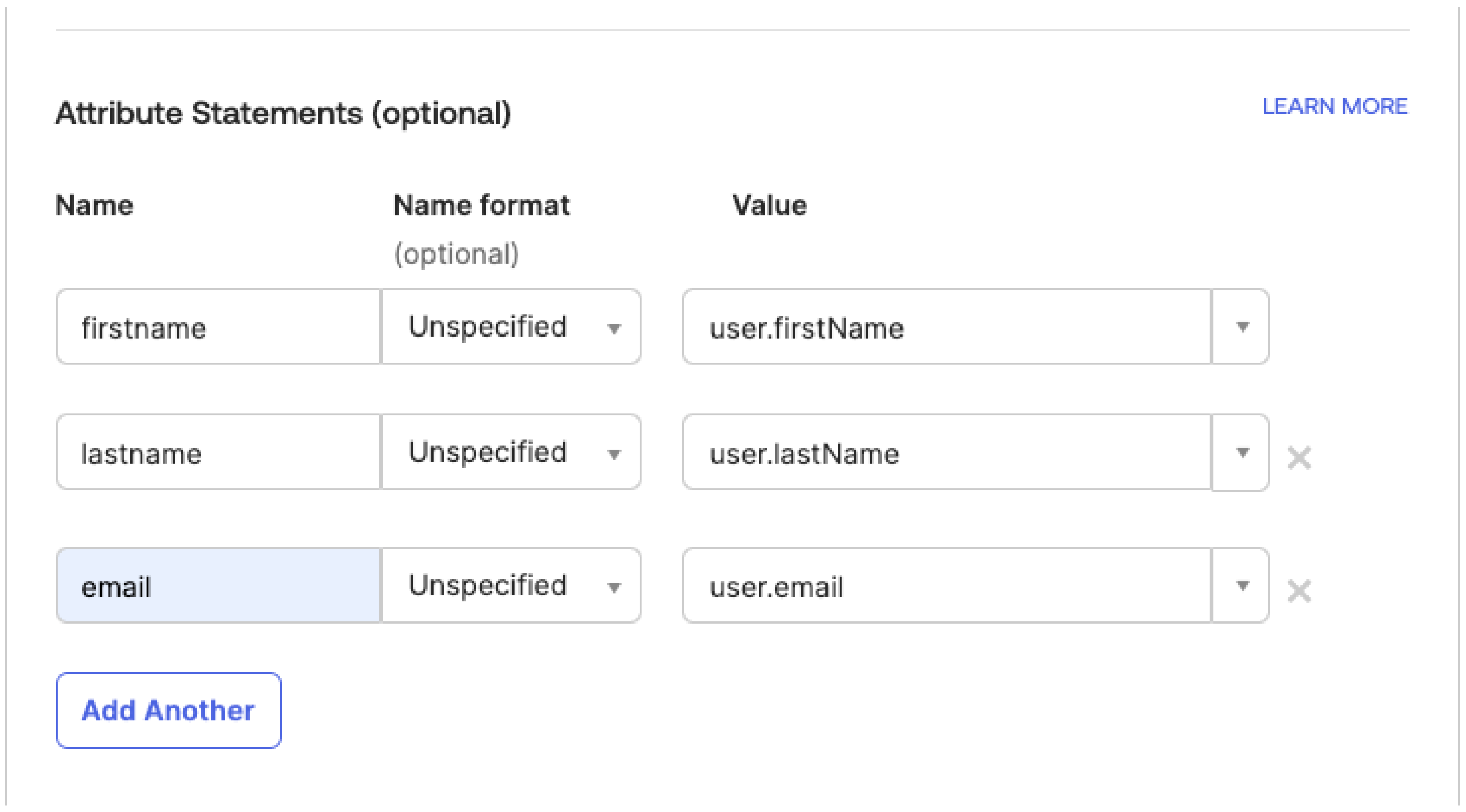
What does this form do?

This form generates the XML needed for the app's SAML request.

Where do I find the info this form needs?

The app you're trying to integrate with should have its own documentation on using SAML. You'll need to find that doc, and it should outline what information you need to specify in this form.

8. Scroll down on the same page and configure the following Attribute Statements
   a. Enter an attribute name in the **Name** column.
   b. Select a value in the **Value** column.
   c. To add another entry, click the **Add Another** button.
   d. Repeat steps a and b.


Attribute Statements (optional)

Name	Name format (optional)	Value
firstname	Unspecified	user.firstName
lastname	Unspecified	user.lastName
email	Unspecified	user.email

9. Click Next.
10. In the displayed page, select **This is an internal app that we created** and click **Finish**.
11. In the displayed Metadata Data details that appear, share the Metadata URL with Thredd.

You can then assign the application to the users or groups who will be using the Thredd services.

6.3 Configuring SSO with Google (SAML)

If your organisation uses Google, you can configure Google as an IdP provider to provide SSO access to various Thredd services. For example, you can use SSO to access Thredd Services, such as Thredd Portal. This page describes the steps for using the 2.0 version of Security Assertion Markup Language (SAML) protocol for setting up SSO.

As a client, you would already have an account on the Google Admin Console.

Note: Setting up SSO is not mandatory, but is recommended.

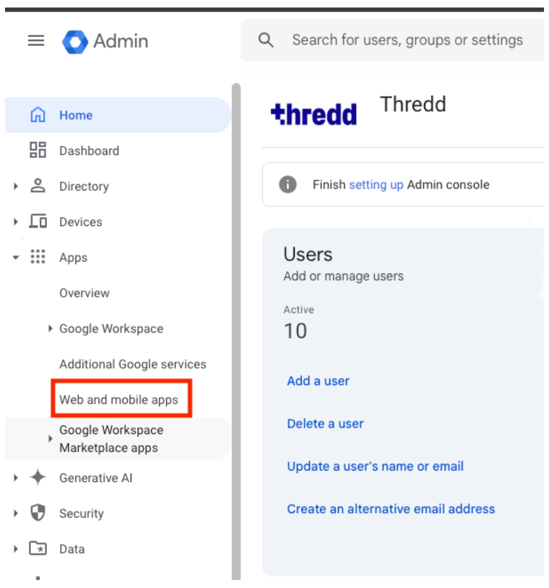
6.3.1 Summary of Steps

The steps involve:

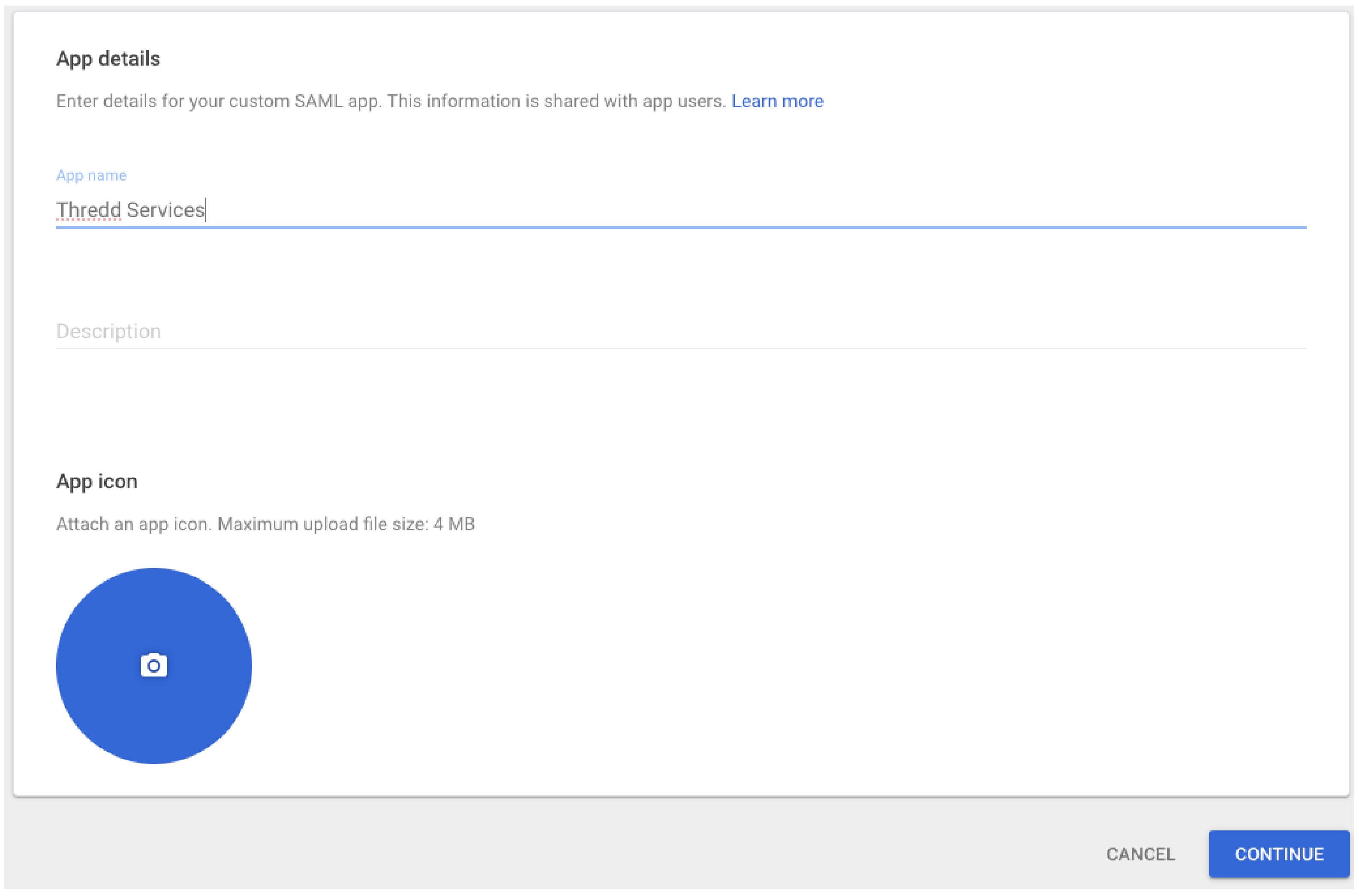
- Creating a SAML app for your SSO connection to Thredd services.
- Choosing either to download IdP metadata or to add configurations from Thredd. If you add configurations from Thredd, you include the SSO URL and the Entity ID.
- Mapping fields associated with the users defined by Google to those used by your app.
- Assigning access permission on your app.

6.3.2 Configuring SSO

1. Log in to the Google Admin console.
2. Select **Apps** > **Web and mobile apps**.


Admin
Search for users, groups or settings
Home
Dashboard
Directory
Devices
Apps
Overview
Google Workspace
Additional Google services
Web and mobile apps
Google Workspace Marketplace apps
Generative AI
Security
Data
thredd
Thredd
Finish setting up Admin console
Users
Add or manage users
Active
10
Add a user
Delete a user
Update a user's name or email
Create an alternative email address

3. Click on **Add app** and select **Add custom SAML app**
4. Enter a name for the app that accesses Thredd services in **App name** and click **Continue**. The next page appears.


App details

Enter details for your custom SAML app. This information is shared with app users. Learn more

App name

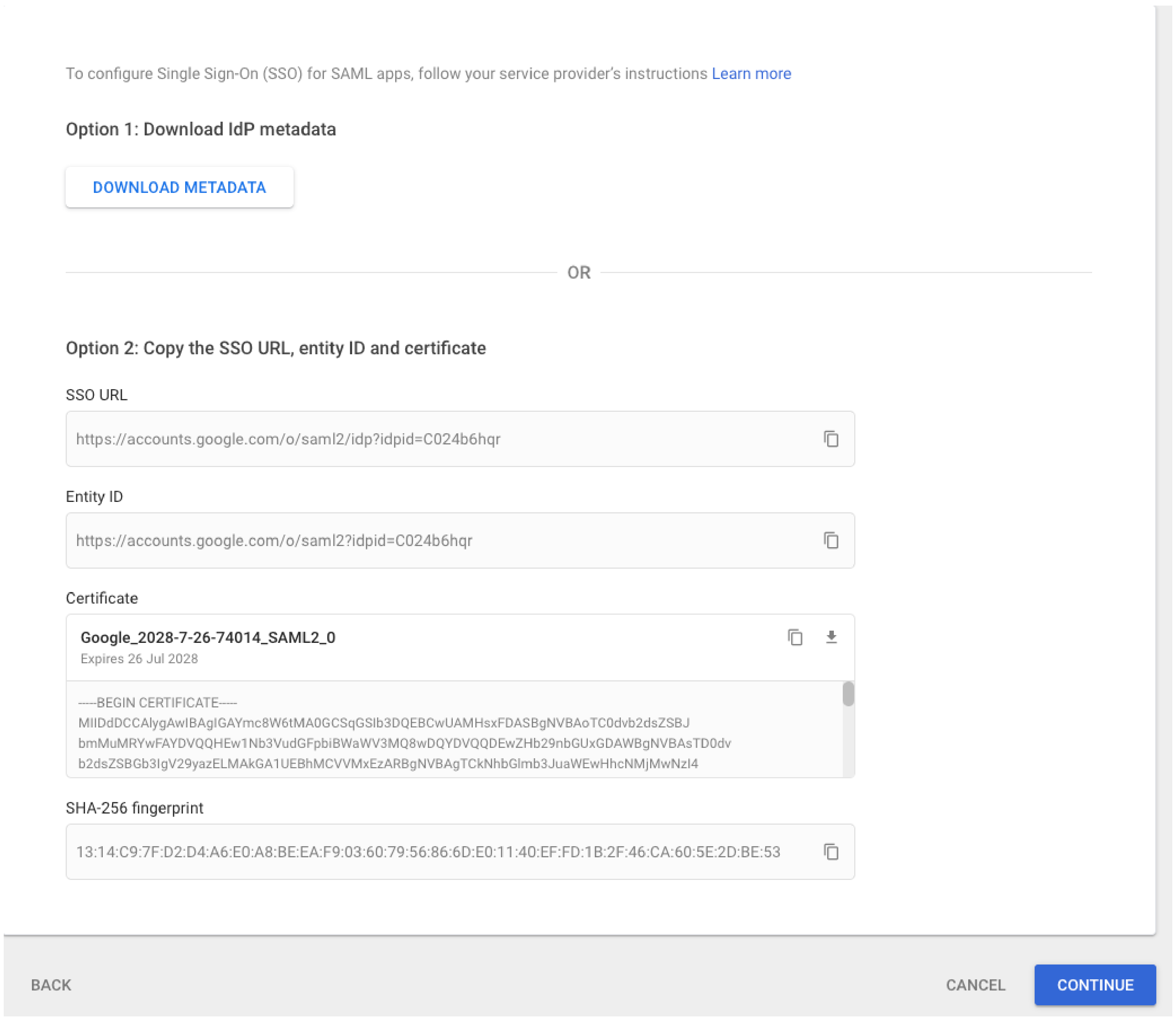
Thredd Services

Description

App icon

Attach an app icon. Maximum upload file size: 4 MB

5. To download the metadata, click **Download Metadata** and save the file. Then share the file with Thredd. Once done, go to step 7.
6. To include entity ID and URL details:
    a. Add the URL in **SSO URL**.
    b. Add in the Entity ID in **Entity ID**. A certificate and a SHA-256 fingerprint appear. These are generated automatically on the console.


To configure Single Sign-On (SSO) for SAML apps, follow your service provider's instructions Learn more

Option 1: Download IdP metadata

Option 2: Copy the SSO URL, entity ID and certificate

SSO URL

https://accounts.google.com/o/saml2/idp?idpid=C024b6hqr

Entity ID

https://accounts.google.com/o/saml2?idpid=C024b6hqr

Certificate

Google_2028-7-26-74014_SAML2_0
Expires 26 Jul 2028

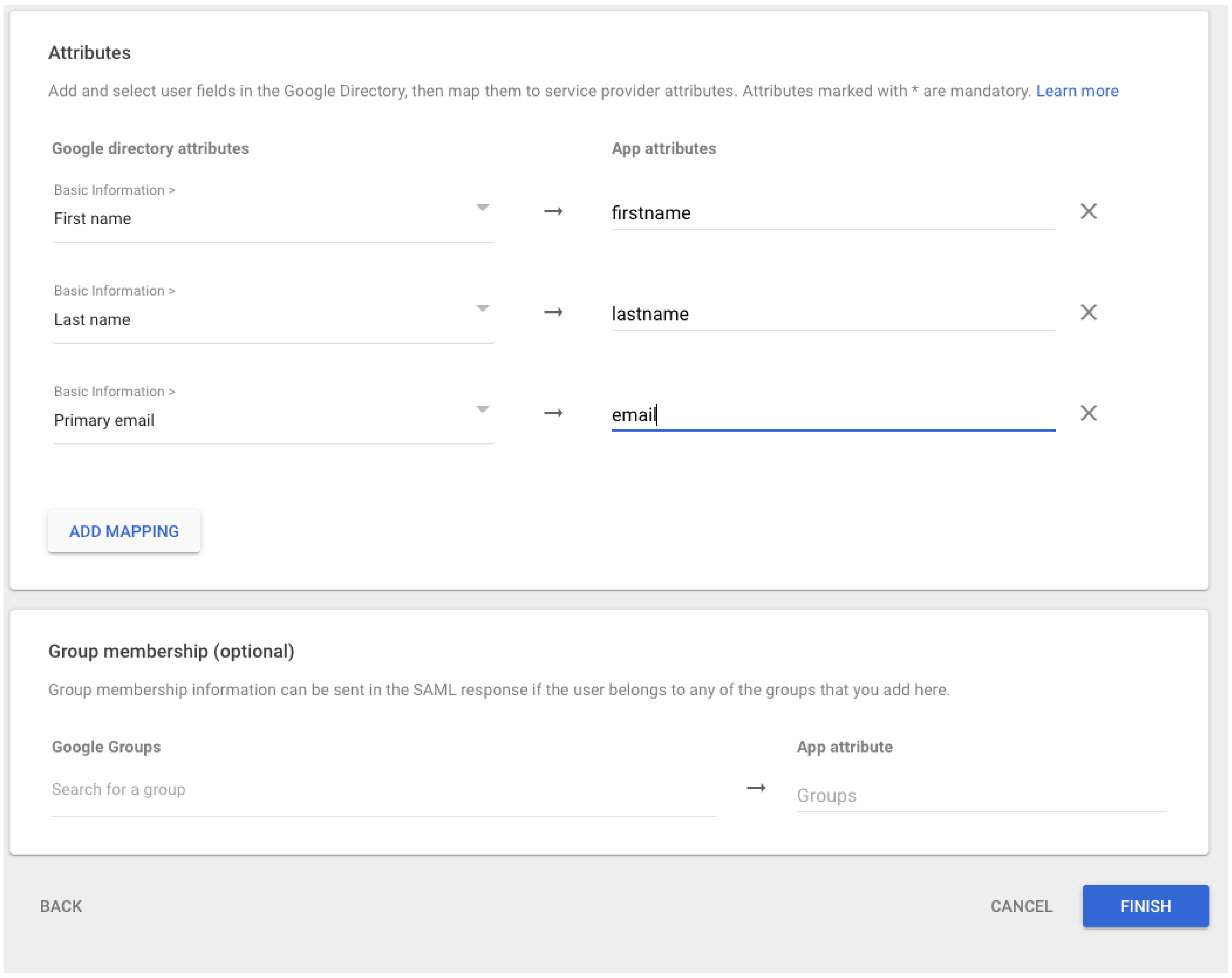
```
-----BEGIN CERTIFICATE-----
MIIDdDCCAlygAwIBAgIGAYmc8W6tMA0GCSqGSIb3DQEBCwUAMHsxFDASBgNVBAoTC0dvb2dsZSBJ
bmMuMRYwFAYDVQQHEw1Nb3VudGFpbiBWaWV3MQ8wDQYDVQQDEwZHb29nbGUxGDAWBgNVBAsTD0dv
b2dsZSBGb3IgV29yazELMAkGA1UEBhMCVVMxEzARBgNVBAgTCkNhbGlmb3JuaWEwHhcNMjMwNzI4
```

SHA-256 fingerprint

13:14:C9:7F:D2:D4:A6:E0:A8:BE:EA:F9:03:60:79:56:86:6D:E0:11:40:EF:FD:1B:2F:46:CA:60:5E:2D:BE:53

7. Click **Continue**
8. Configure attribute mapping.
    a. Click the **Add Mapping** button.
    b. Select a group in **Google directory attributes** and choose a group in **App attributes**.
    c. To add another entry, click the **Add Mapping** button again and repeat the step for choosing both attributes.

The following shows an example.



Attributes

Add and select user fields in the Google Directory, then map them to service provider attributes. Attributes marked with * are mandatory. Learn more

Google directory attributes	App attributes
Basic Information > First name	firstname
Basic Information > Last name	lastname
Basic Information > Primary email	email

Group membership (optional)

Group membership information can be sent in the SAML response if the user belongs to any of the groups that you add here.

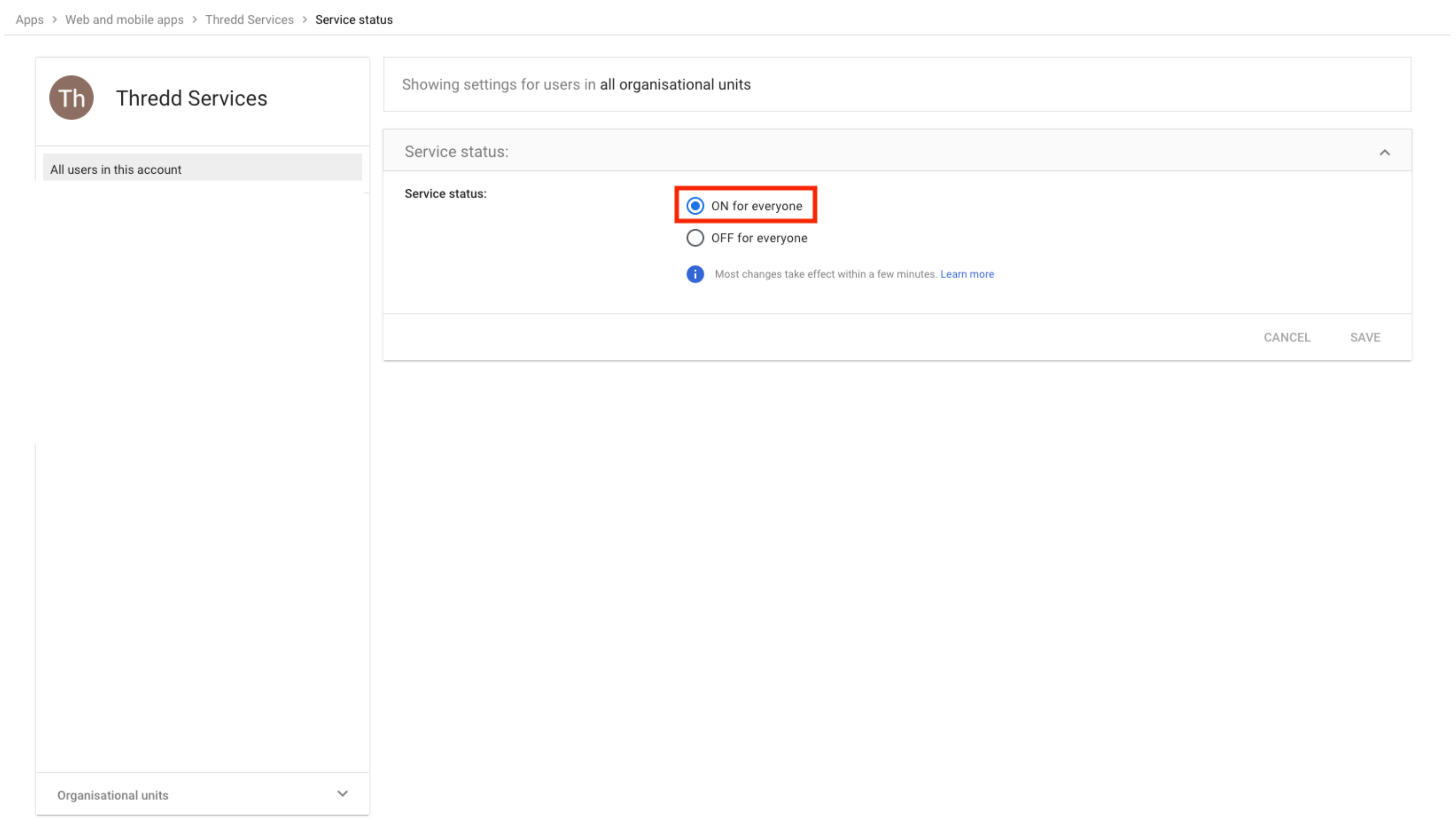
Google Groups	App attribute
Search for a group	Groups

9. Click **Finish**.
10. Once completed, select access permission options (see the following procedure).

Setting Access Permission Options

You can set access permission options for the app based on anyone who holds a Google account, membership of specific Google groups, and Organisational units. An organisational unit is a named organisation within Google.

1. To provide access to anyone who holds a corporate Google account, select **All users in this account** on the left hand menu. Then choose **ON for everyone** in the main screen.


Apps > Web and mobile apps > Thredd Services > Service status

Thredd Services

All users in this account

Organisational units

Showing settings for users in all organisational units

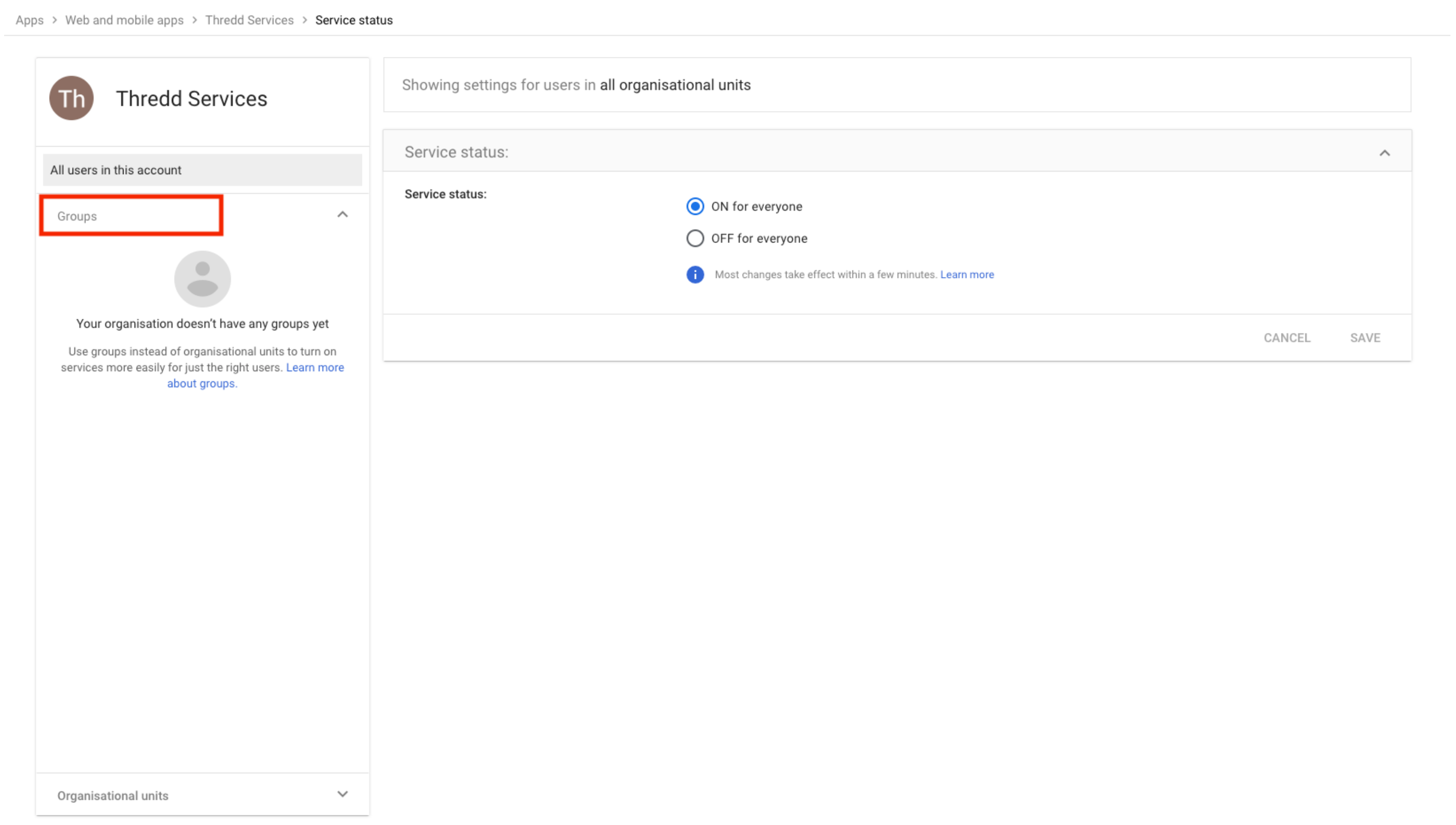
Service status:

Service status: [✓ ON for everyone] OFF for everyone

Most changes take effect within a few minutes. Learn more

CANCEL SAVE

2. To provide access to members of a selected group:
    a. Select **Groups** on the left hand menu.
    b. Select a group.
    c. Select **ON for everyone** in the main screen.


Apps > Web and mobile apps > Thredd Services > Service status

Thredd Services

All users in this account

Groups

Your organisation doesn't have any groups yet

Use groups instead of organisational units to turn on services more easily for just the right users. Learn more about groups.

Organisational units

Showing settings for users in all organisational units

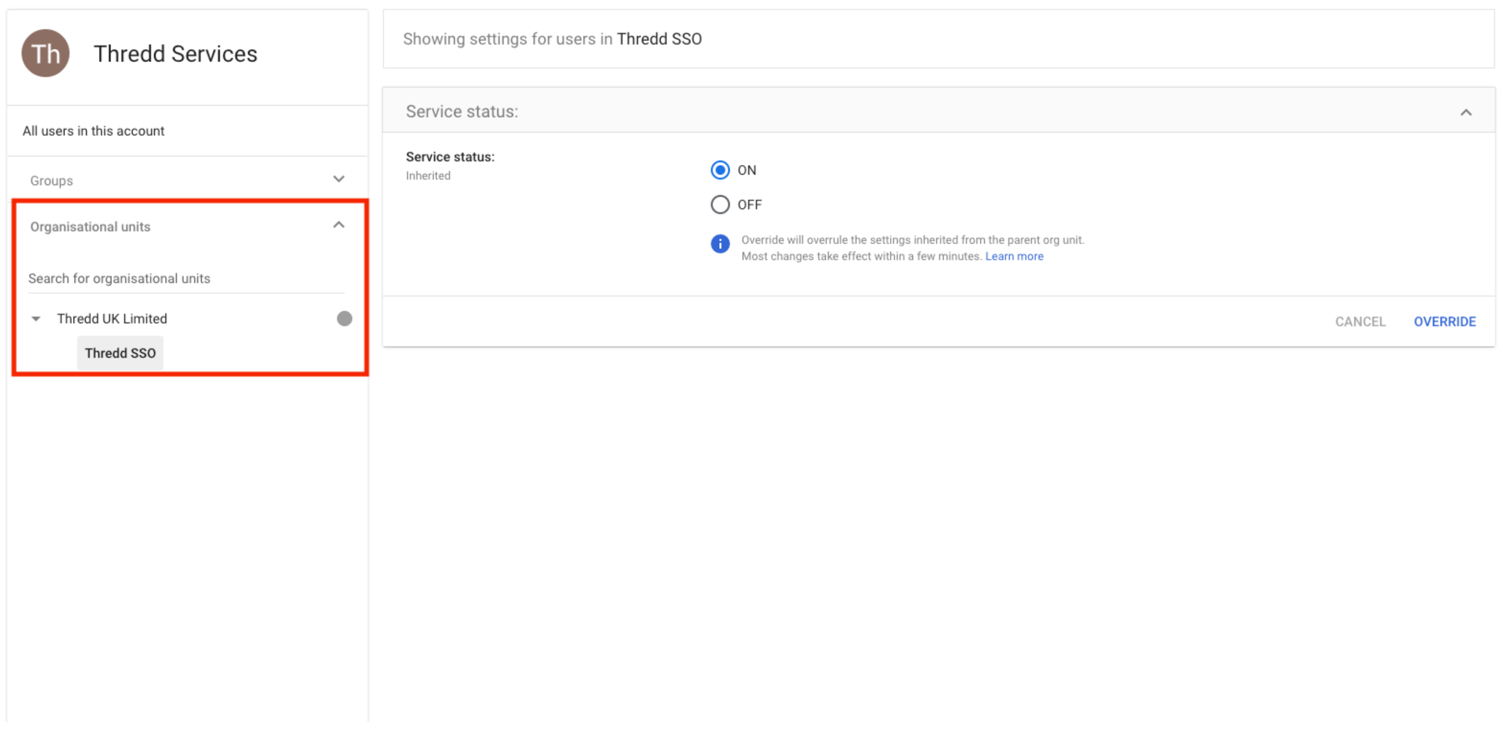
Service status:

Service status: [✓ ON for everyone] OFF for everyone

Most changes take effect within a few minutes. Learn more

CANCEL SAVE

3. To provide access to members of specific Organisational units:
    a. Select **Organisational units** on the left hand menu.
    b. Select an Organisational unit.
    c. Select **ON for everyone** in the main screen.


Th Thredd Services

All users in this account

Groups

Organisational units

Search for organisational units

Thredd UK Limited

Thredd SSO

Showing settings for users in Thredd SSO

Service status:

Service status:
Inherited

[✓ ON]
OFF

Override will overrule the settings inherited from the parent org unit.
Most changes take effect within a few minutes. Learn more

CANCEL OVERRIDE

6.4 Configuring SSO with Okta (OIDC)

If your organisation uses Okta, you can configure Okta as an IdP provider to provide SSO access to various Thredd services. For example, you can use SSO to access Thredd Services such as Thredd Portal. This page describes the steps for using the OpenID Connect (OIDC) protocol for setting up SSO.

Note: Setting up SSO is not mandatory, but is recommended.

6.4.1 Overview

The steps involve:

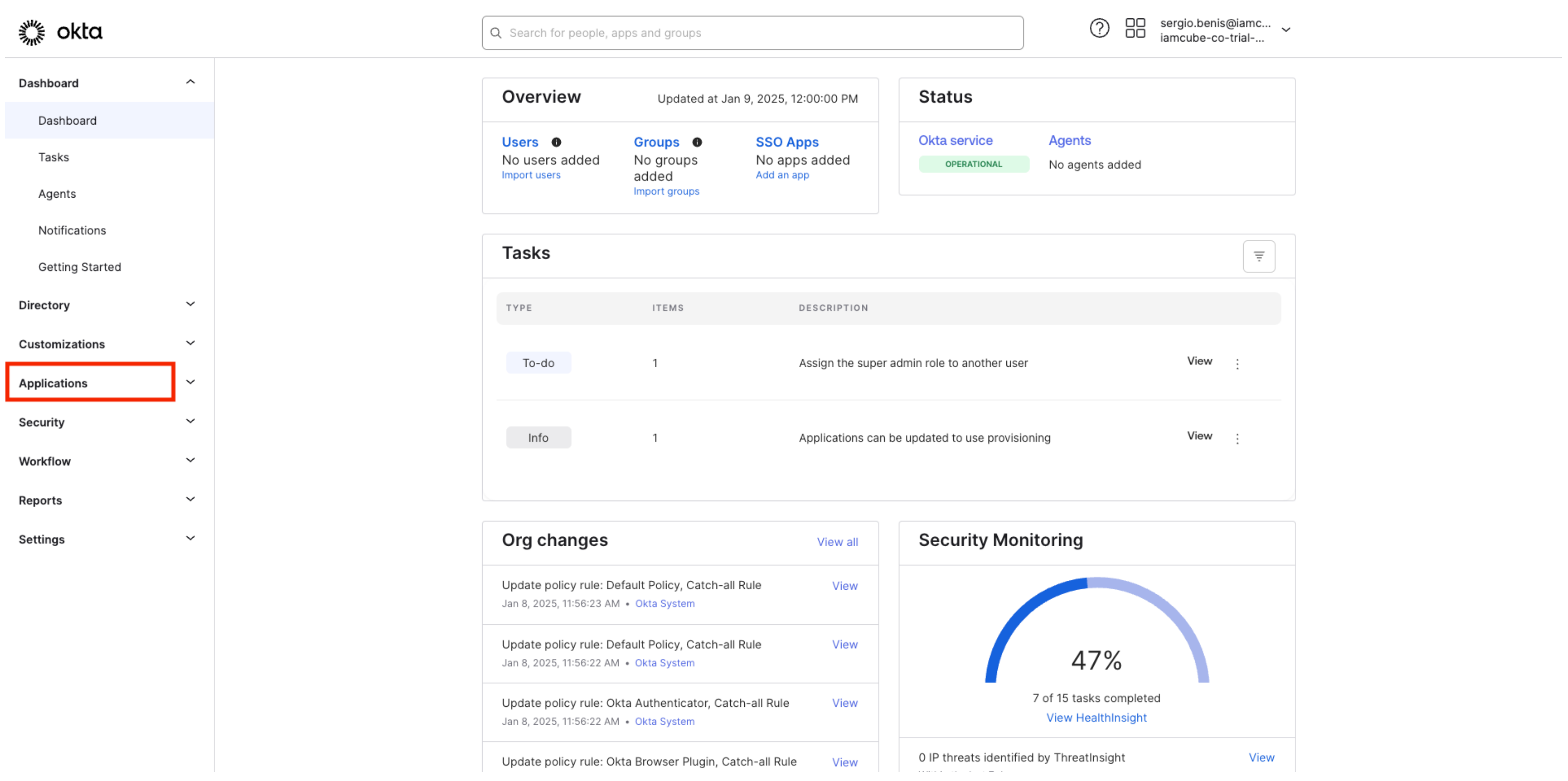
- Creating an app and app integration.
- Setting URL and refresh token settings.
- Specifying your access control requirement.
- Sharing authentication details with Thredd, through either the Client ID/Client Secret method or the private_key_jwt authentication method.

  Note: Thredd recommends using the private_key_jwt authentication method.

Thredd will provide you with a Sign-in Redirect URI for creating a web application integration.

6.4.2 Configure SSO

1. Log in to the Okta Administration console.
2. Select **Applications** from the left-hand menu.



TYPE	ITEMS	DESCRIPTION	
To-do	1	Assign the super admin role to another user	View
Info	1	Applications can be updated to use provisioning	View

Update policy rule: Default Policy, Catch-all Rule View
Jan 8, 2025, 11:56:23 AM • Okta System

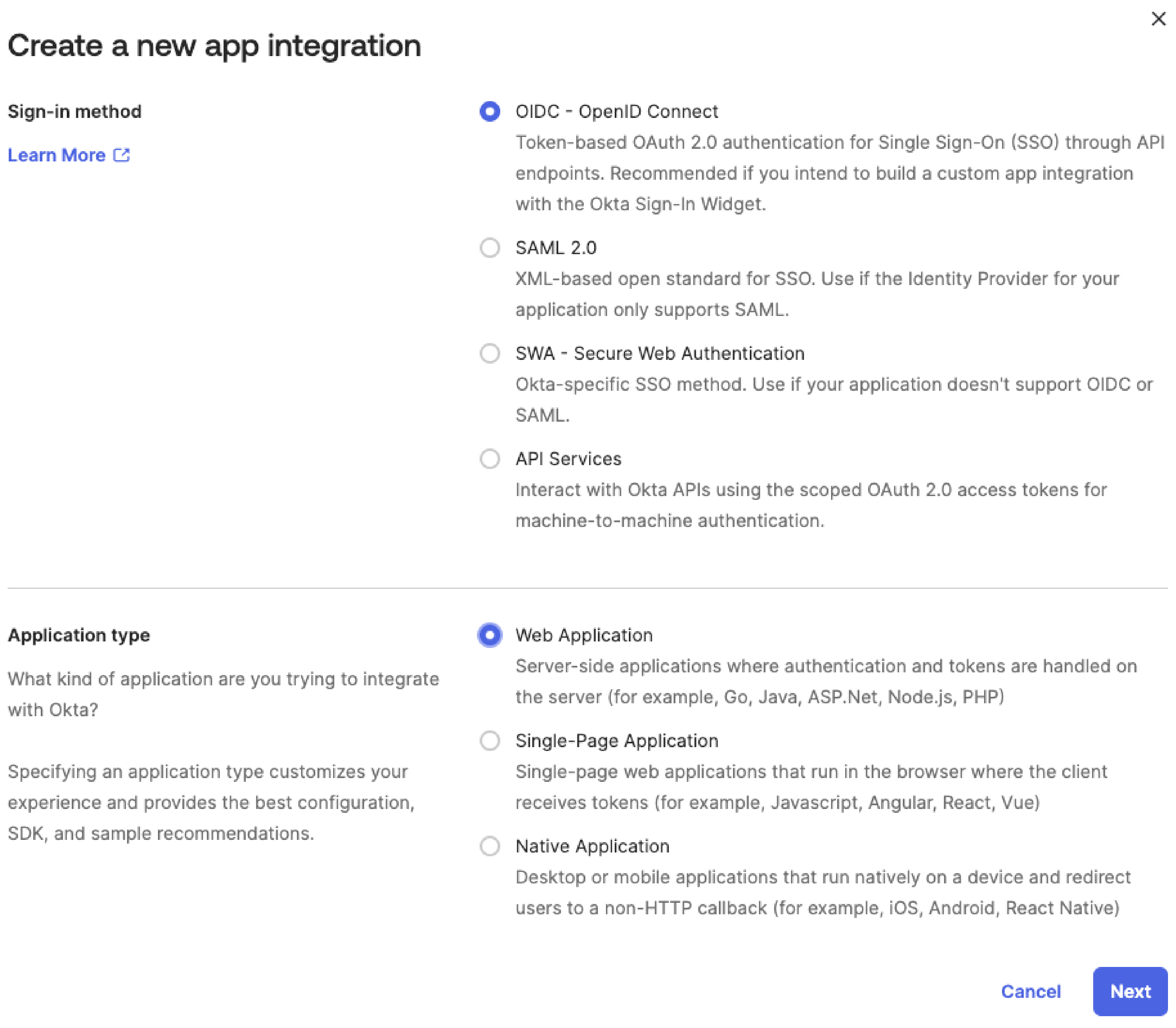
Update policy rule: Default Policy, Catch-all Rule View
Jan 8, 2025, 11:56:22 AM • Okta System

Update policy rule: Okta Authenticator, Catch-all Rule View
Jan 8, 2025, 11:56:22 AM • Okta System

Update policy rule: Okta Browser Plugin, Catch-all Rule View

0 IP threats identified by ThreatInsight View

3. Click **Create Application**.
4. In Create a new application integration, select **OIDC - OpenID Connect** and **Web Application.**



Create a new app integration

Sign-in method

Learn More

[✓ OIDC - OpenID Connect]
Token-based OAuth 2.0 authentication for Single Sign-On (SSO) through API endpoints. Recommended if you intend to build a custom app integration with the Okta Sign-In Widget.

SAML 2.0
XML-based open standard for SSO. Use if the Identity Provider for your application only supports SAML.

SWA - Secure Web Authentication
Okta-specific SSO method. Use if your application doesn't support OIDC or SAML.

API Services
Interact with Okta APIs using the scoped OAuth 2.0 access tokens for machine-to-machine authentication.

Application type

What kind of application are you trying to integrate with Okta?

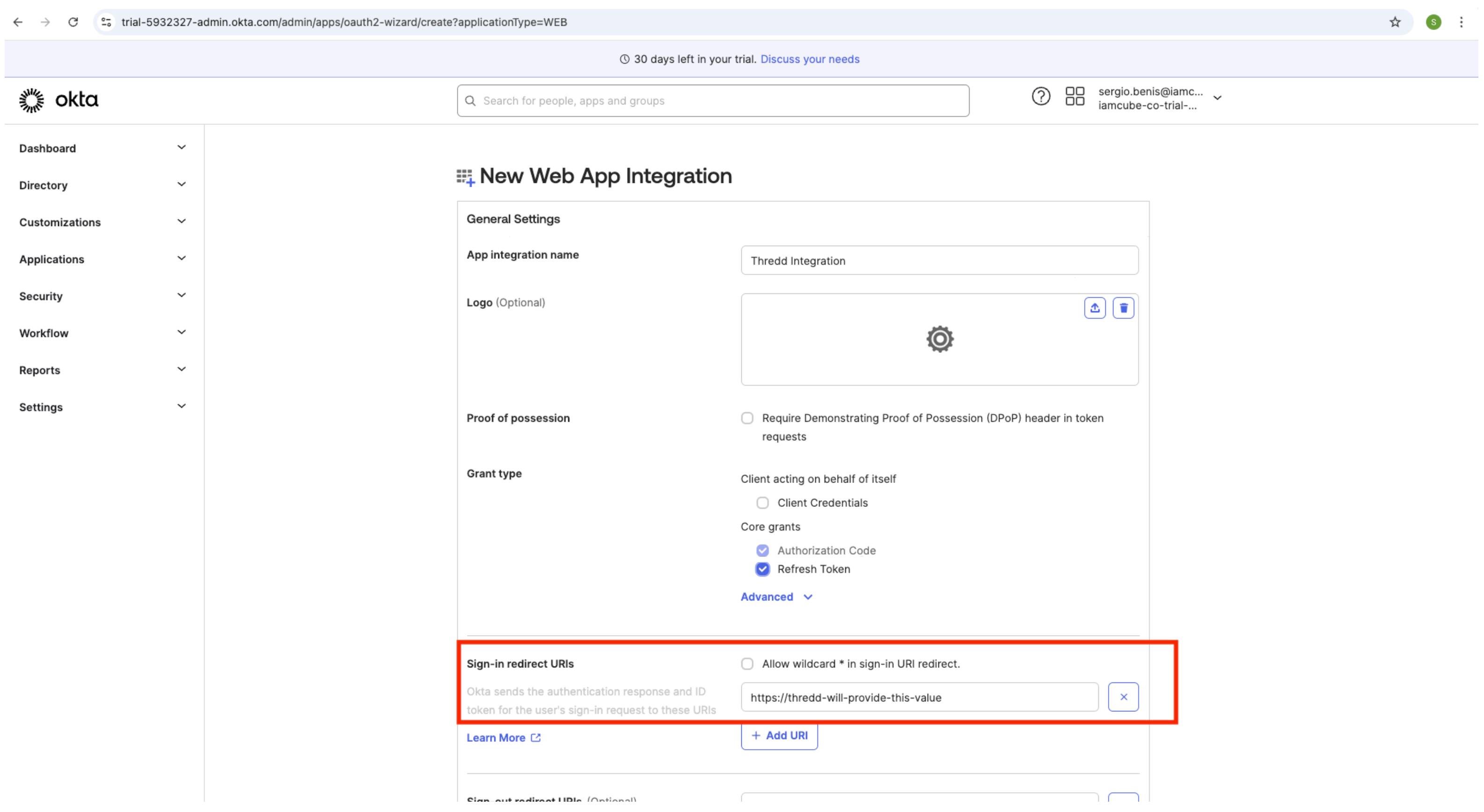
Specifying an application type customizes your experience and provides the best configuration, SDK, and sample recommendations.

[✓ Web Application]
Server-side applications where authentication and tokens are handled on the server (for example, Go, Java, ASP.Net, Node.js, PHP)

Single-Page Application
Single-page web applications that run in the browser where the client receives tokens (for example, Javascript, Angular, React, Vue)

Native Application
Desktop or mobile applications that run natively on a device and redirect users to a non-HTTP callback (for example, iOS, Android, React Native)

5. Click **Next.**
6. Enter a name for your application integration in **Application integration name**.
7. Select the **Refresh Token** check box.
8. Enter the URL value of the Sign-in redirect URIs in the Sign-in redirect URIs section.



trial-5932327-admin.okta.com/admin/apps/oauth2-wizard/create?applicationType=WEB

30 days left in your trial. Discuss your needs

New Web App Integration

General Settings

App integration name: Thredd Integration

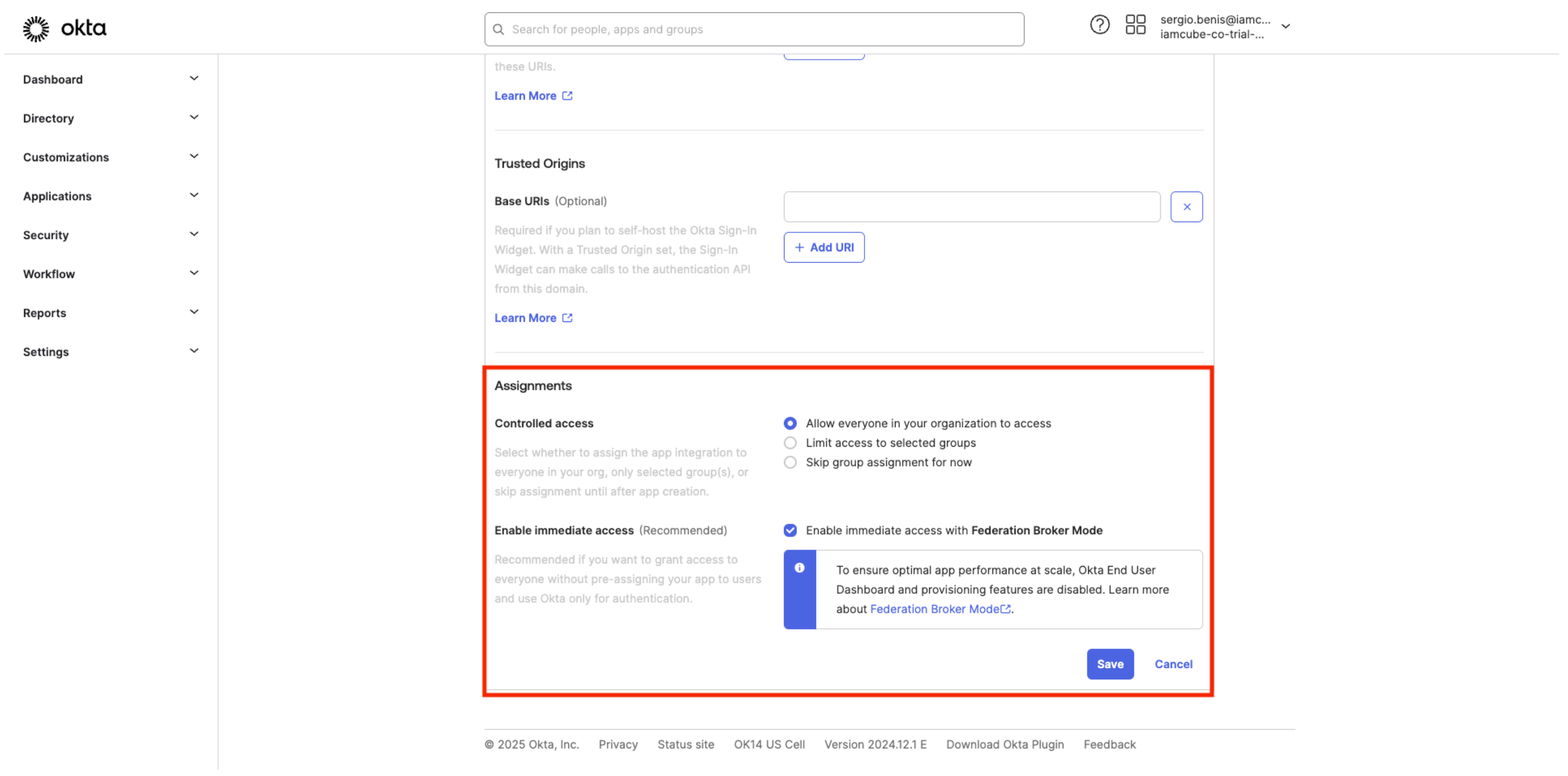
Logo (Optional)

Proof of possession: ☐ Require Demonstrating Proof of Possession (DPoP) header in token requests

Grant type:
Client acting on behalf of itself
☐ Client Credentials
Core grants
✓ Authorization Code
✓ Refresh Token
Advanced

Sign-in redirect URIs: ☐ Allow wildcard * in sign-in URI redirect.
Okta sends the authentication response and ID token for the user's sign-in request to these URIs
https://thredd-will-provide-this-value

9. Select how you want to control access to Thredd applications from your organisation. The example below shows that access is available to all users in your organisation, and where there is immediate access.



these URIs.

Trusted Origins

Base URIs (Optional)

Required if you plan to self-host the Okta Sign-In Widget. With a Trusted Origin set, the Sign-In Widget can make calls to the authentication API from this domain.

Assignments

Controlled access

Select whether to assign the app integration to everyone in your org, only selected group(s), or skip assignment until after app creation.

- [✓ Allow everyone in your organization to access]
- Limit access to selected groups
- Skip group assignment for now

Enable immediate access (Recommended)

Recommended if you want to grant access to everyone without pre-assigning your app to users and use Okta only for authentication.

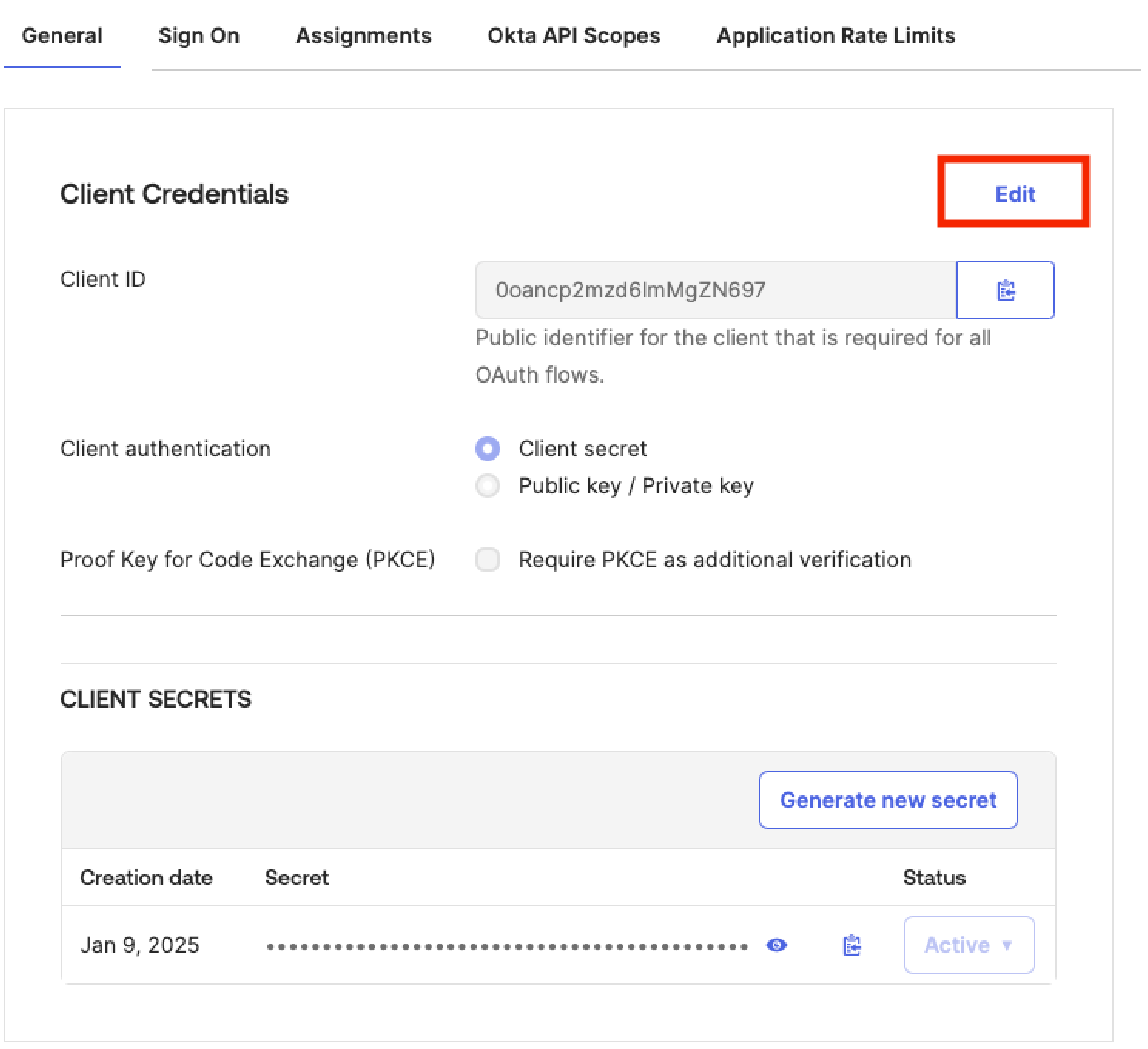
[✓] Enable immediate access with **Federation Broker Mode**

To ensure optimal app performance at scale, Okta End User Dashboard and provisioning features are disabled. Learn more about Federation Broker Mode.

10. Share details with Thredd
    - If you are using a Client ID/Client secret, share this detail with Thredd using your preferred secure method.
    - If you prefer Thredd's recommended authetication method of `private_key_jwt`, perform the steps below for sharing the private key.

Share the Private Key `private_key_jwt`

1. Select the application that you have just created under **General**.
2. Click Edit next to **Client Credentials**.



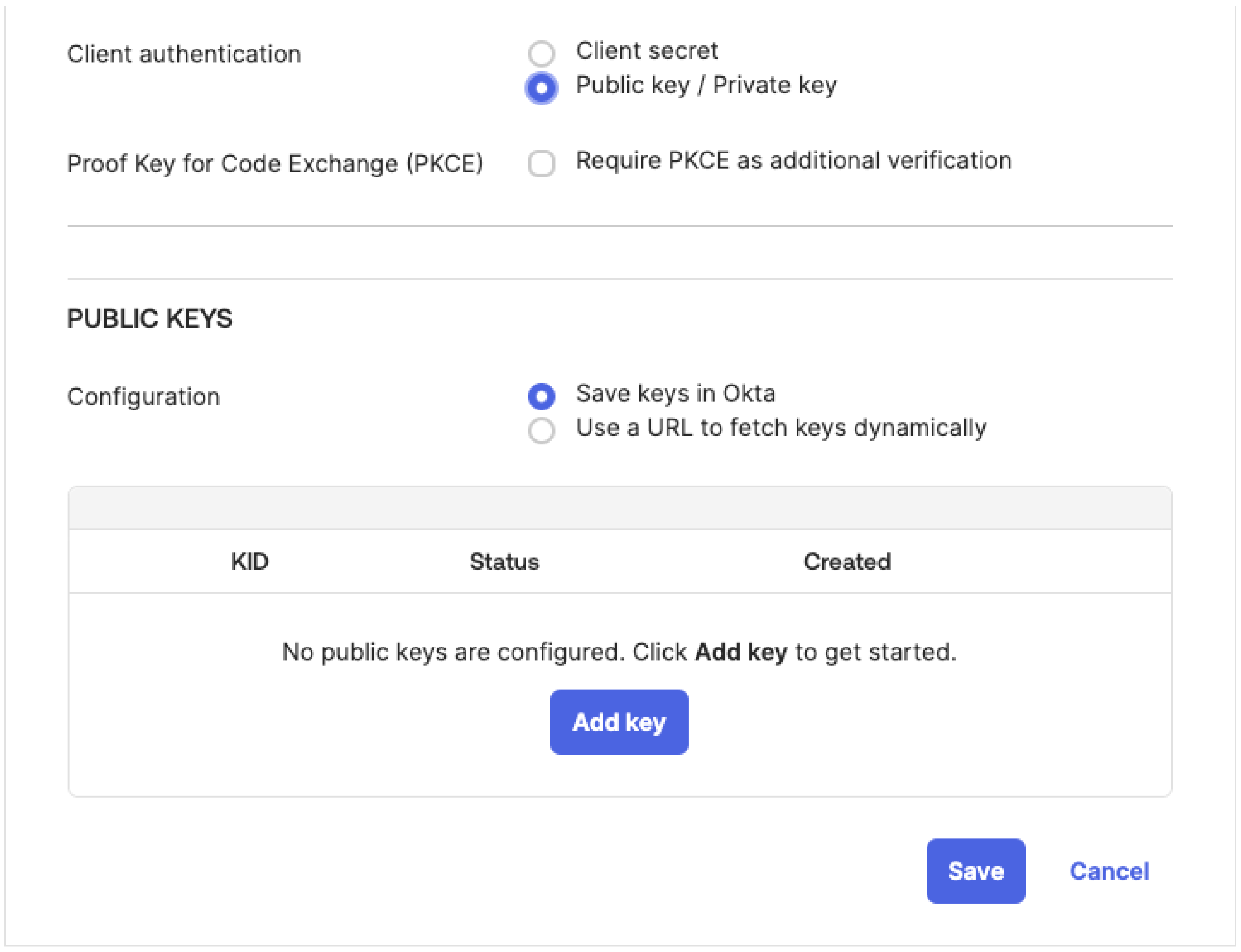
Client Credentials

Client ID	0oancp2mzd6lmMgZN697 — Public identifier for the client that is required for all OAuth flows.
Client authentication	[✓ Client secret] Public key / Private key
Proof Key for Code Exchange (PKCE)	Require PKCE as additional verification

CLIENT SECRETS

Creation date	Secret	Status
Jan 9, 2025	••	Active

3. Select **Public Key / Private Key**, the page updates to show the public key configuration options:


Client authentication ○ Client secret [✓ ● Public key / Private key]

Proof Key for Code Exchange (PKCE) ☐ Require PKCE as additional verification

PUBLIC KEYS

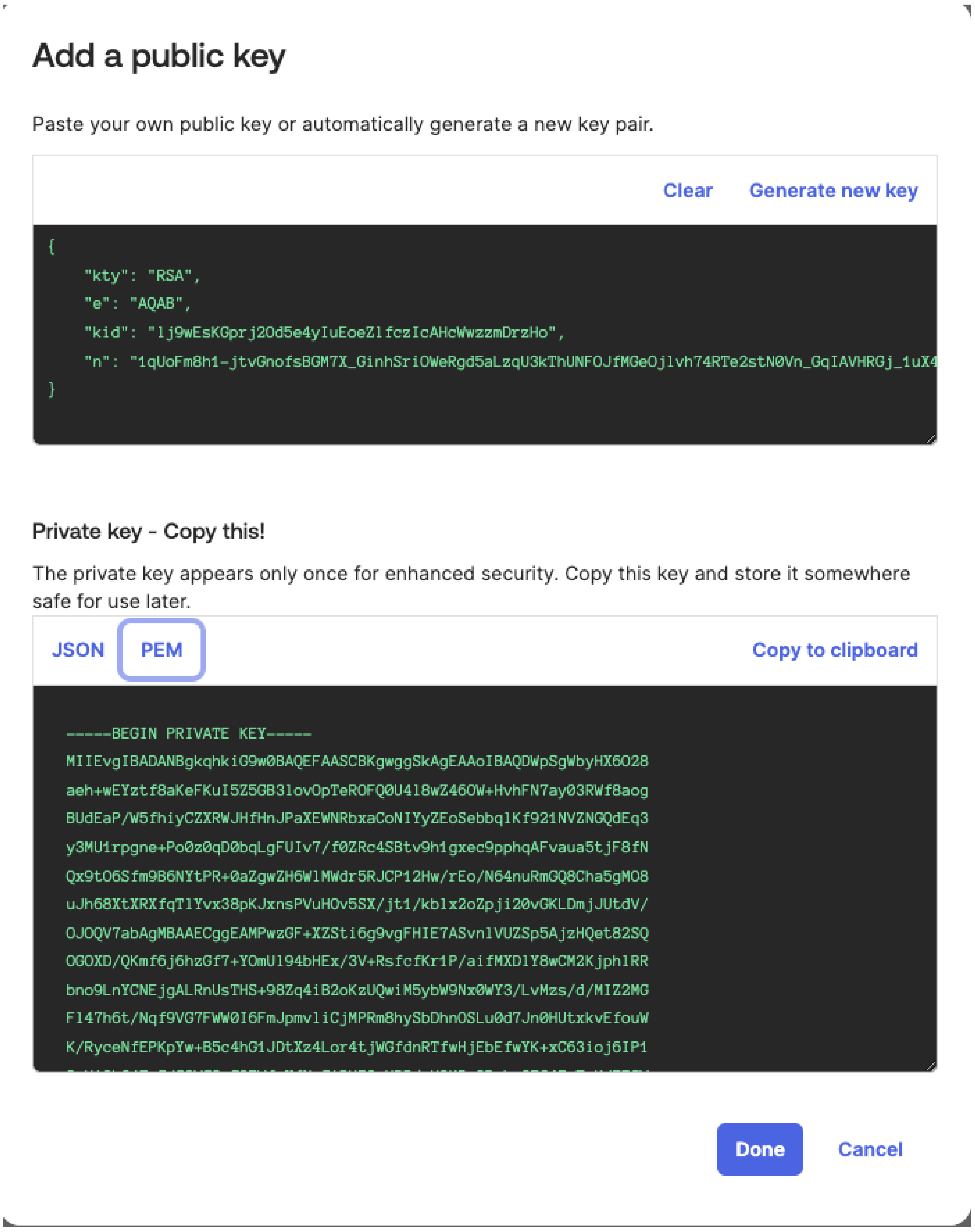
Configuration [✓ ● Save keys in Okta] ○ Use a URL to fetch keys dynamically

KID	Status	Created

No public keys are configured. Click **Add key** to get started.

4. Click **Add key**. The Add a public key screen appears.
5. Select **Generate new key**.
6. When the private key is shown, select PEM.
7. Copy the value to your clipboard and save it.

You will need to share the private key with Thredd. The following shows the on-screen instructions that appear for generating and copying a private key.


Add a public key

Paste your own public key or automatically generate a new key pair.

```
{
    "kty": "RSA",
    "e": "AQAB",
    "kid": "lj9wEsKGprj2Od5e4yIuEoeZlfczIcAHcWwzzmDrzHo",
    "n": "1qUoFm8h1-jtvGnofsBGM7X_GinhSriOWeRgd5aLzqU3kThUNFOJfMGeOjlvh74RTe2stN0Vn_GqIAVHRGj_1uX4
}
```

Private key - Copy this!

The private key appears only once for enhanced security. Copy this key and store it somewhere safe for use later.

```
-----BEGIN PRIVATE KEY-----
MIIEvgIBADANBgkqhkiG9w0BAQEFAASCBKgwggSkAgEAAoIBAQDWpSgWbyHX6O28
aeh+wEYztf8aKeFKuI5Z5GB3lovOpTeROFQ0U4l8wZ46OW+HvhFN7ay03RWf8aog
BUdEaP/W5fhiyCZXRWJHfHnJPaXEWNRbxaCoNIYyZEoSebbqlKf921NVZNGQdEq3
y3MU1rpgne+Po0z0qD0bqLgFUIv7/f0ZRc4SBtv9h1gxec9pphqAFvaua5tjF8fN
Qx9tO6Sfm9B6NYtPR+0aZgwZH6WlMWdr5RJCP12Hw/rEo/N64nuRmGQ8Cha5gMO8
uJh68XtXRXfqTlYvx38pKJxnsPVuHOv5SX/jt1/kblx2oZpji20vGKLDmjJUtdV/
OJOQV7abAgMBAAECggEAMPwzGF+XZSti6g9vgFHIE7ASvnlVUZSp5AjzHQet82SQ
OGOXD/QKmf6j6hzGf7+YOmUl94bHEx/3V+RsfcfKr1P/aifMXDlY8wCM2KjphlRR
bno9LnYCNEjgALRnUsTHS+98Zq4iB2oKzUQwiM5ybW9Nx0WY3/LvMzs/d/MIZ2MG
Fl47h6t/Nqf9VG7FWW0I6FmJpmvliCjMPRm8hySbDhnOSLu0d7Jn0HUtxkvEfouW
K/RyceNfEPKpYw+B5c4hG1JDtXz4Lor4tjWGfdnRTfwHjEbEfwYK+xC63ioj6IP1
```

8. Click **Done**.

General FAQs

Q. What is the Secure Connectivity Framework?

The Secure Connectivity Framework is the combination of several components which enable secure access to Thredd's resources, using a common identity store. For more information, see Secure Connectivity Framework.

Q. What is the Thredd Certificate Authority (CA)?

The Thredd CA enables you to create the transport and signing certificates required to connect to Thredd services. Using the Thredd CA Public Key Infrastructure (PKI), you can create Signing Certificates (used for *private_key_jwt* authentication) and Transport Certificates for mTLS connections.

Q. What is the role of Cloudentity?

Cloudentity is used for several purposes:

- A central hub Identity Provider / Authorisation Server for Users to authenticate with - including federated authentication using the Single Sign On capabilities of Thredd's customers.
- An Identity Pool (multiple identity pools, one per organisation) with Users and their Roles all managed in one place.
- An Authorisation Server for Server-to-Server communication (for Confidential Clients to gain Access Tokens)
- A Policy Decision Point (PDP) to Allow / Deny access to protected Thredd Resources (Core REST APIs) based on policies which check attributes of incoming REST requests including Access Token Claims, mTLS Certificates, and User Roles.

Glossary

This page provides a list of glossary terms used in this guide.

C

Card Scheme (Network)

Card network, such as Discover, MasterCard, or Visa, responsible for managing transactions over the network and for arbitration of any disputes.

Certificate Authority

A Certificate Authority is an entity that validates the identities of entities (such as individuals, organizations, or websites) and binds them to cryptographic key pairs through the issuance of digital certificates.

Cloudentity

A service that provides identity, authorization, and open banking solutions to help organizations deliver secure digital transformation. Cloudentity is the Identity Provider (IdP) for Raidiam CA and Thredd Portal, and is also an OAuth OpenID Provider (OP) for the REST API.

Confidential Client

A client that can maintain the confidentiality of their credentials (e.g., client implemented on a secure server with restricted access to the client credentials), or capable of secure client authentication using other means. For more details, refer to RFC 6749 for the OAuth 2.0 Authorization Framework.

E

External Host Interface (EHI)

The external system to which Thredd sends real-time transaction-related data. The Program Manager uses their external host system to hold details of the balance on the cards in their programme and perform transaction-related services, such as payment authorisation, transaction matching and reconciliation.

I

Identity Provider (IDP)

An IDP is a system entity that creates, maintains, and manages identity information for principals and also provides authentication services for relying on applications within a federation or distributed network.

M

Mutual Transport Layer Security (mTLS)

mTLS is a method for mutual authentication that ensures the parties at each end of a network connection are who they claim to be by verifying that they both have the correct private key. The information within their respective TLS certificates provides additional verification.

O

OAuth OpenID Provider

An OAuth OpenID Provider (OP) is an entity that has implemented the OpenID Connect and OAuth 2.0 protocols. OPs can also be referred to by the role it plays, such as: a security token service, an identity provider (IDP), or an authorization server. In the Thredd Platform, the OP enforces access control policies in Cloudentity.

P

Program Manager

A customer who manages a card program. The program manager can create branded cards, load funds and provide other card or banking services to their end customers.

S

Secure Connectivity Framework

The Secure Connectivity Framework is an umbrella set of rules and standards for identity management, verification, and assurance within a sector. The framework establishes common principles, definitions, and Open Standards for data sharing to create the foundations of a trusted data-sharing ecosystem

Smart Client

Smart Client is a user interface for programme managers to manage their account on the Thredd Platform. Smart Client is installed as a desktop application.

T

Thredd CA

Thredd CA (Certificate Authority) acts as the Certificate Authority for issuing certificates. It also includes a dashboard interface where you can create applications for your organisation, as well as assertions.

Transport Certificate

A Transport Certificate (or TLS Certificate) is a data file that contains important information for verifying a server's or device's identity, including the public key, a statement of who issued the certificate (TLS certificates are issued by a Certificate Authority), and the certificate's expiration date.

Document History

This section provides details of what has changed since the previous document release.

Version	Date	Reason	Revised by
1.0	25/03/2025	First version	WS

Contact Us

Please contact us if you have queries relating to this document. Our contact details are provided below.

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Technical Publications

If you want to contact our technical publications team directly, for queries or feedback related to this guide, you can email us at: docs@thredd.com.