REST API in APEX

Architectural constraints/Characteristics

Stateless

Each request from client to server must contain all the information necessary to understand the request, and not use any stored context on the server.

Caching behavior

Responses are labeled as cacheable or non-cacheable.

Uniform interface

All resources are accessed with a generic interface over HTTP.

Named resources

All resources are named using a base URI that follows your Lightning Platform URI.

Layered components

allows for the existence of such intermediaries as proxy servers and gateways to exist between the client and the resources.

Authentication

Uses Oath2.0.

Support for JSON and XML

JSON is the default. You can use the `HTTP ACCEPT` header to select either JSON or XML, or append `json` or `xml` to the URI

Compression

The REST API allows the use of compression on the request and the response, using the standards defined by the HTTP 1.1 specification. Compression is automatically supported by some clients, and can be manually added to others. For better performance.

Request compression: Add **`Accept-Encoding: gzip`** or **`Accept-Encoding: deflate`** in a request Header.

Response compression : in response header **`Content-Encoding: gzip/Content-Encoding: deflate`**

Authorization Through Connected Apps and OAuth 2.0

A connected app requests access to REST API resources on behalf of the client application.

OAuth 2.0 is an open protocol that authorizes secure data sharing between applications through the exchange of tokens.
OAuth authorization flows grant a client app restricted access to REST API resources on a resource server. Each OAuth flow offers a different process for approving access to a client app, but in general the flows consist of three main steps.

1. a connected app, on behalf of a client app, requests access to a REST API resource.
2. In response, an authorizing server grants access tokens to the connected app.
3. A resource server validates these access tokens and approves access to the protected REST API resource.

Perform Cross-Origin Requests from Web Browsers

Suppose a user visits http://www.example.com and the page attempts a cross-origin request to fetch the user's data from http://service.example.com. A CORS-compatible browser will attempt to make a cross-origin request to service.example.com.

In Salesforce, add the origin serving the code to a CORS allowlist.

1. enter `CORS` in the `Quick Find` box, then select **CORS**
2. **New**
3. Enter a URL Pattern

   You can add (*) wildcard at 2nd level domain, Example : `https://*.example.com`.

If a browser that supports CORS makes a request to an origin in the allowlist, Salesforce returns the origin in the **Access-Control-Allow-Origin** HTTP header along with any additional CORS HTTP headers. If the origin isn't included in the allowlist, Salesforce returns HTTP status code 403.

Connected App and OAuth Terminology

https://help.salesforce.com/articleView?id=sf.remoteaccess_terminology.htm&type=5

Access Token: Instead of using the user's Salesforce credentials, a consumer (connected app) can use an access token to gain access to protected resources on behalf of the user. For OAuth 2.0, the access token is a session ID and can be used directly.

Authorization Code: In Oath 2.0, The authorization code is used to obtain an access token and a refresh token. It expires after 15 minutes.

Authorization Server: server that authorizes a resource owner, and upon successful authorization, issues access tokens to the requesting consumer.

Callback URL: A callback URL is the URL that is invoked after OAuth authorization for the consume.

OAuth Endpoint: OAuth endpoints are the URLs that you use to make OAuth authorization requests to Salesforce.

Consumer : A consumer is the website or app that uses OAuth to authorize both the Salesforce user and itself on the user's behalf. Referred to as client in OAuth 2.0.

Consumer Key :A consumer uses a key to identify itself to Salesforce. Referred to as client_id in OAuth 2.0.

Consumer Secret : A consumer uses a secret to establish ownership of the consumer key. Referred to as client_secret in OAuth 2.0.

Refresh Token : Only used in OAuth 2.0, a consumer can use a refresh token to obtain a new access token, without having the end user approve the access again.

Resource Owner: The resource owner is the entity (usually the end user) that grants access to a protected resource.

Resource Server : The resource server is the server that hosts the protected resource. Your Salesforce org is the resource server that protects your data.

Token Secret : A consumer uses this secret to establish ownership of a given token, both for request tokens and access tokens.

Connected Apps

A connected app is a framework that enables an external application to integrate with Salesforce using APIs and standard protocols, such as Security Assertion Markup Language (SAML), OAuth, and OpenID Connect. Connected apps use these protocols to authorize, authenticate, and provide single sign-on (SSO) for external apps.

Developers create and configure authorization flows for connected apps, and admins set policies and permissions to control connected app usage.

1. **Access Data with API Integration**: web-based or mobile applications that need to pull data from your Salesforce org, you can use connected apps as the clients to request this data. Use OAuth 2.0 **Security**.
   a. Web Server integration – Web -> connected app -> Salesforce
   b. Mobile integration -> mobile to salesforce/ can use mobile SDK instead of connected app.
   c. Server to Server integration -> no need to be real time, can do authorization and authentication in advance by sending JSON WEB TOKEN or JWT
   d. IOT integration -> for devices like TV , having limited input capabilities.

2. **Integrate Service Providers with Salesforce**: SSO
   a. You want your users to be able to log in to their app with their Salesforce credentials. Using SAML 2.0 for user **authentication**.
   b. OpenID Connect is a protocol that enables SSO between two services, like SAML2.0. It adds an authentication layer on top of OAuth 2.0 to enable secure exchange of ID tokens that contain user information alongside OAuth access tokens.

3. **Provide Authorization for External API Gateways:** Using OpenID Connect dynamic client registration, resource servers can dynamically create client apps as connected apps in Salesforce, by sending request to authorization server. The authorization server

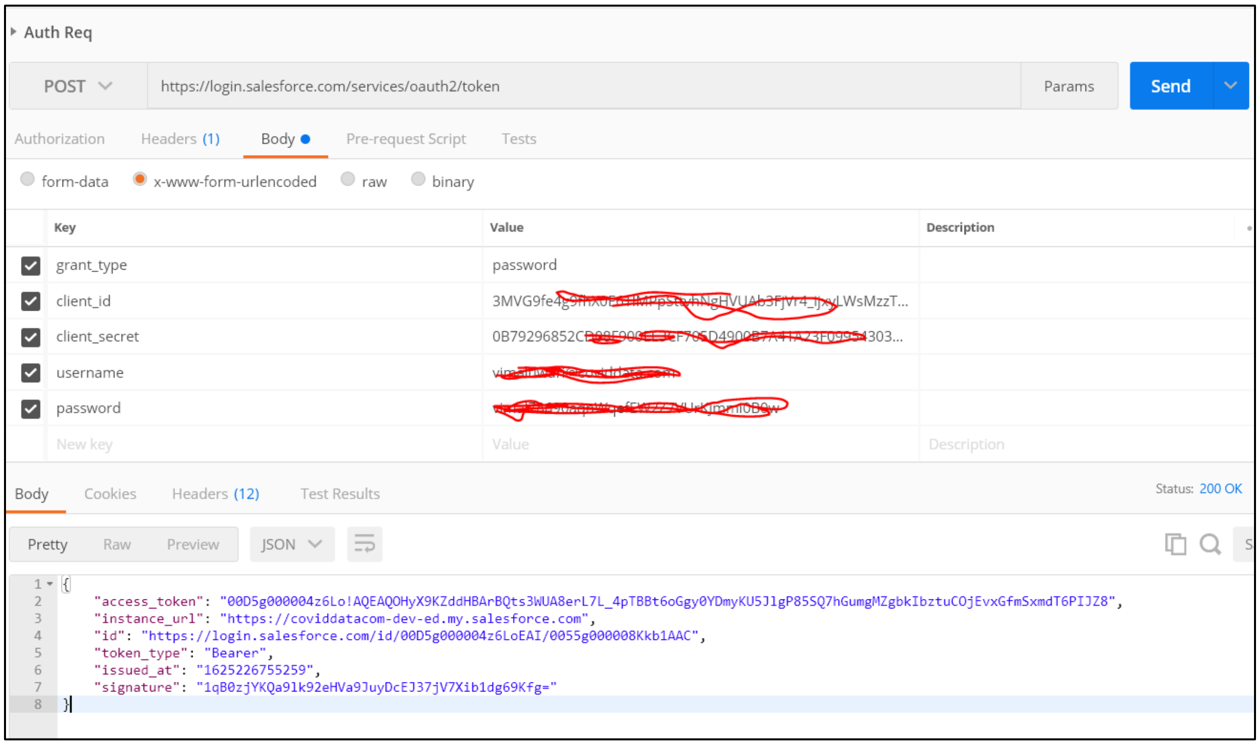
verifies the resource server's request and creates the connected app, giving it a unique client ID and client secret.

Basic Rest Based data movement Demo using Connected App and OAuth2.0

Steps for Org 1 acting as Server.

1. In response Server i.e. your org providing service, create Apex class for Account Rest Services
2. Create a connected App there. Use Basic Tutorial of Rest API with Oauth2.0 for creation and testing Rest Services.

Auth :


Auth Req

POST https://login.salesforce.com/services/oauth2/token

Body: x-www-form-urlencoded

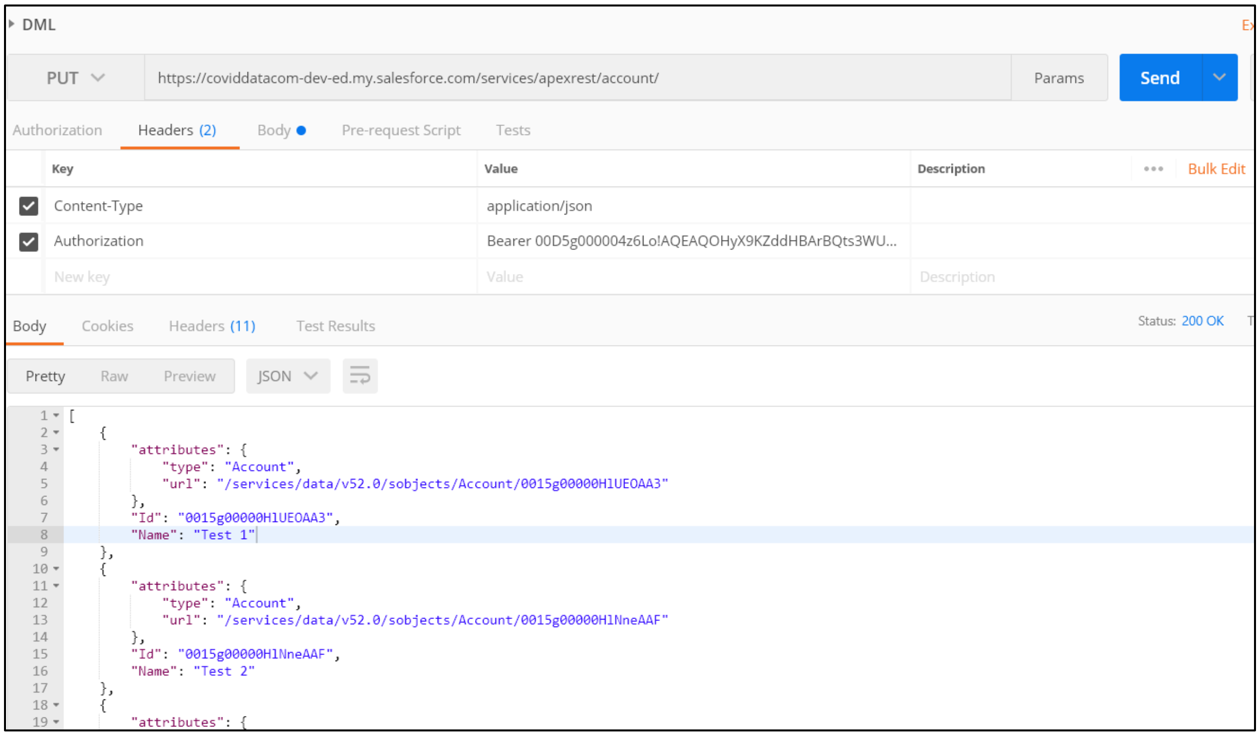
Key	Value	Description
✓ grant_type	password	
✓ client_id	3MVG9fe4g[redacted]LWsMzzT…	
✓ client_secret	0B79296852C[redacted]303…	
✓ username	[redacted]	
✓ password	[redacted]	
New key	Value	Description

Status: 200 OK

```
{
    "access_token": "00D5g000004z6Lo!AQEAQOHyX9KZddHBArBQts3WUA8erL7L_4pTBBt6oGgy0YDmyKU5J1gP85SQ7hGumgMZgbkIbztuCOjEvxGfmSxmdT6PIJZ8",
    "instance_url": "https://coviddatacom-dev-ed.my.salesforce.com",
    "id": "https://login.salesforce.com/id/00D5g000004z6LoEAI/0055g000008Kkb1AAC",
    "token_type": "Bearer",
    "issued_at": "1625226755259",
    "signature": "1qB0zjYKQa9lk92eHVa9JuyDcEJ37jV7Xib1dg69Kfg="
}
```

Rest Testing

In authorization : Bearer <access-token>



PUT https://coviddatacom-dev-ed.my.salesforce.com/services/apexrest/account/

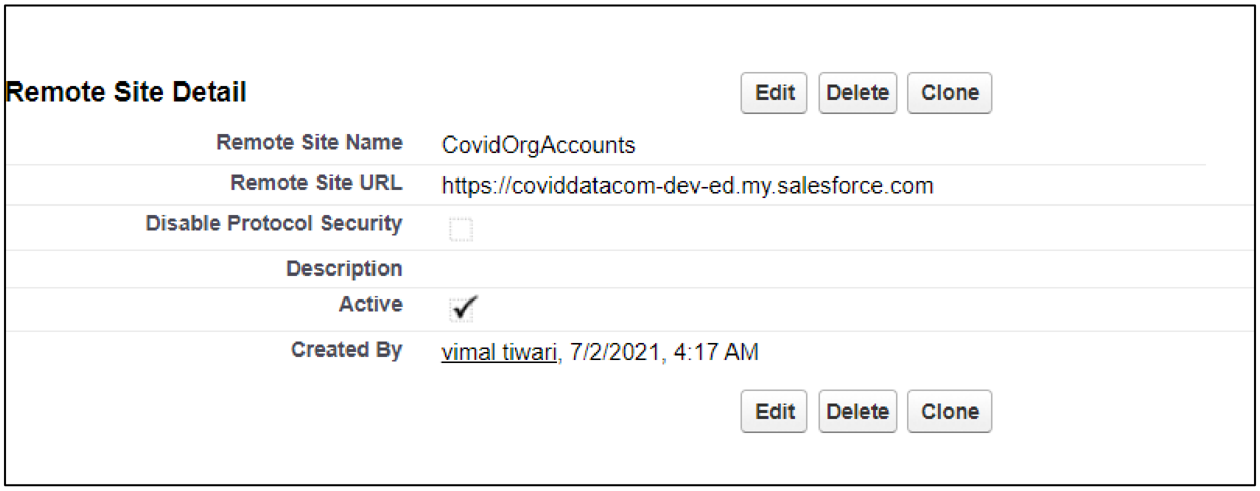
	Key	Value	Description
✓	Content-Type	application/json	
✓	Authorization	Bearer 00D5g000004z6Lo!AQEAQOHyX9KZddHBArBQts3WU...	
	New key	Value	Description

Status: 200 OK

```
[
    {
        "attributes": {
            "type": "Account",
            "url": "/services/data/v52.0/sobjects/Account/0015g00000H1UEOAA3"
        },
        "Id": "0015g00000H1UEOAA3",
        "Name": "Test 1"
    },
    {
        "attributes": {
            "type": "Account",
            "url": "/services/data/v52.0/sobjects/Account/0015g00000H1NneAAF"
        },
        "Id": "0015g00000H1NneAAF",
        "Name": "Test 2"
    },
    {
        "attributes": {
```

Steps for Org 2 acting as Client

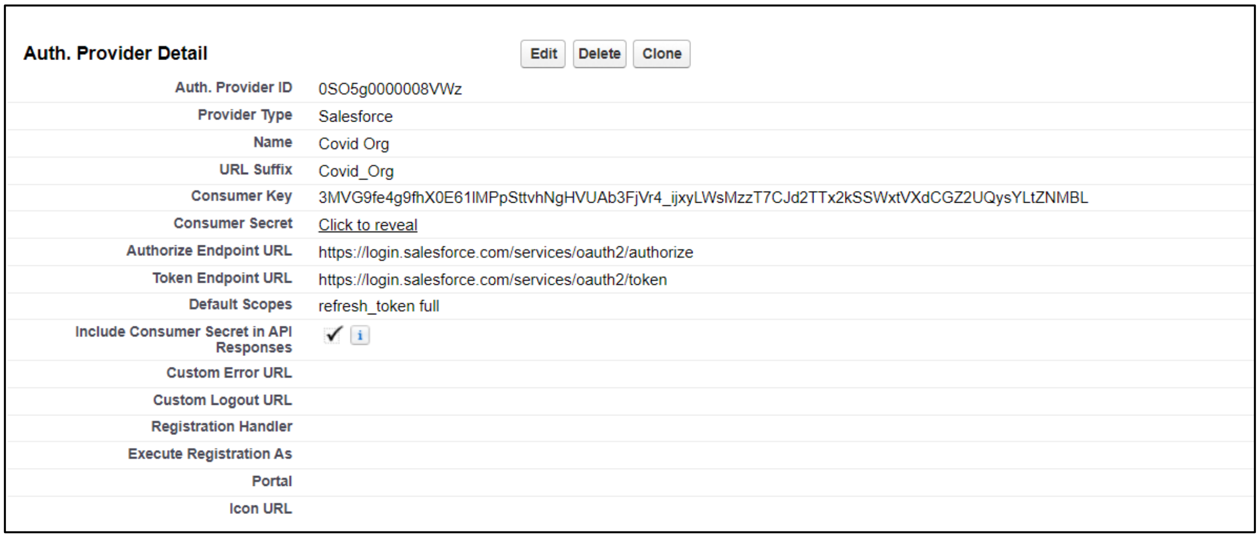
1. Set Remote site settings for Org 1 as Base URL, because we can't hit any external system, without registering it, either here or in NC.



Remote Site Detail

Remote Site Name	CovidOrgAccounts
Remote Site URL	https://coviddatacom-dev-ed.my.salesforce.com
Disable Protocol Security	☐
Description	
Active	✓
Created By	vimal tiwari, 7/2/2021, 4:17 AM

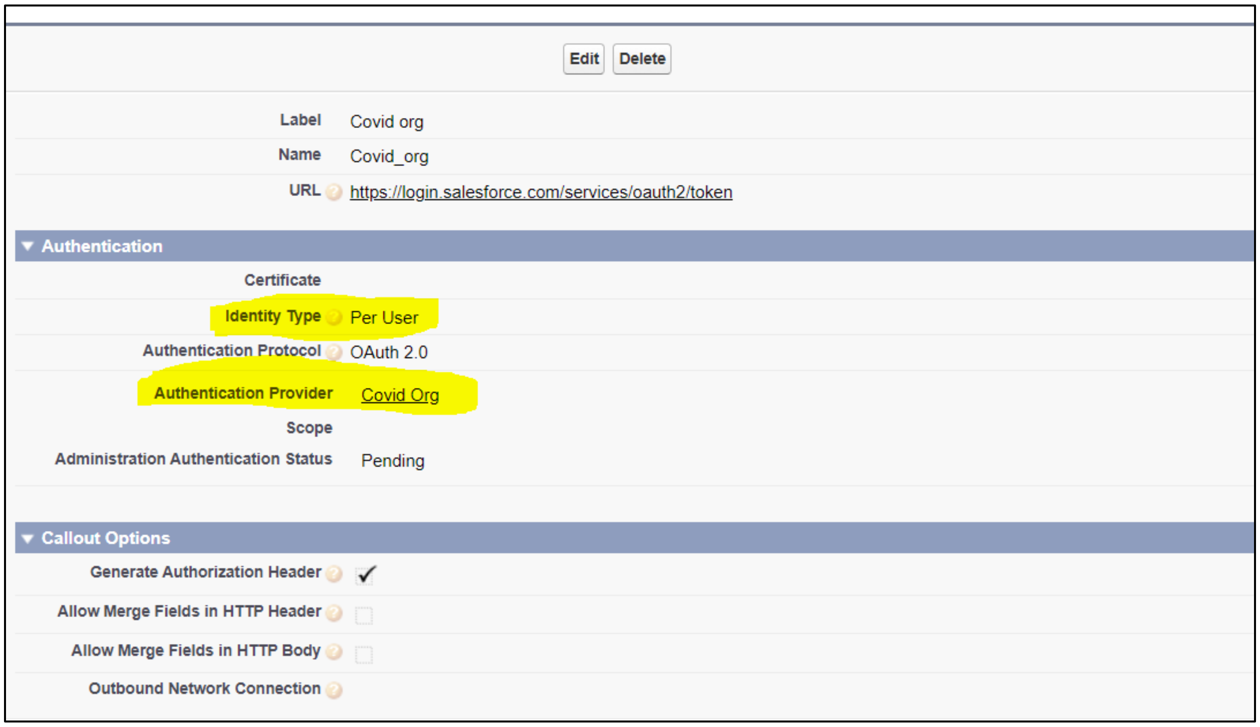
2. Create Authorization Provider – req. in Named Credentials
    a. Setup -> Auth. Provider
    b. Default scope – **refresh_token full**



Auth. Provider Detail

Auth. Provider ID	0SO5g0000008VWz
Provider Type	Salesforce
Name	Covid Org
URL Suffix	Covid_Org
Consumer Key	3MVG9fe4g9fhX0E61lMPpSttvhNgHVUAb3FjVr4_ijxyLWsMzzT7CJd2TTx2kSSWxtVXdCGZ2UQysYLtZNMBL
Consumer Secret	Click to reveal
Authorize Endpoint URL	https://login.salesforce.com/services/oauth2/authorize
Token Endpoint URL	https://login.salesforce.com/services/oauth2/token
Default Scopes	refresh_token full
Include Consumer Secret in API Responses	✓
Custom Error URL	
Custom Logout URL	
Registration Handler	
Execute Registration As	
Portal	
Icon URL	

3. Create Named Credentials
    a. Provide Auth. Provider for Oauth 2.0



Label	Covid org
Name	Covid_org
URL	https://login.salesforce.com/services/oauth2/token

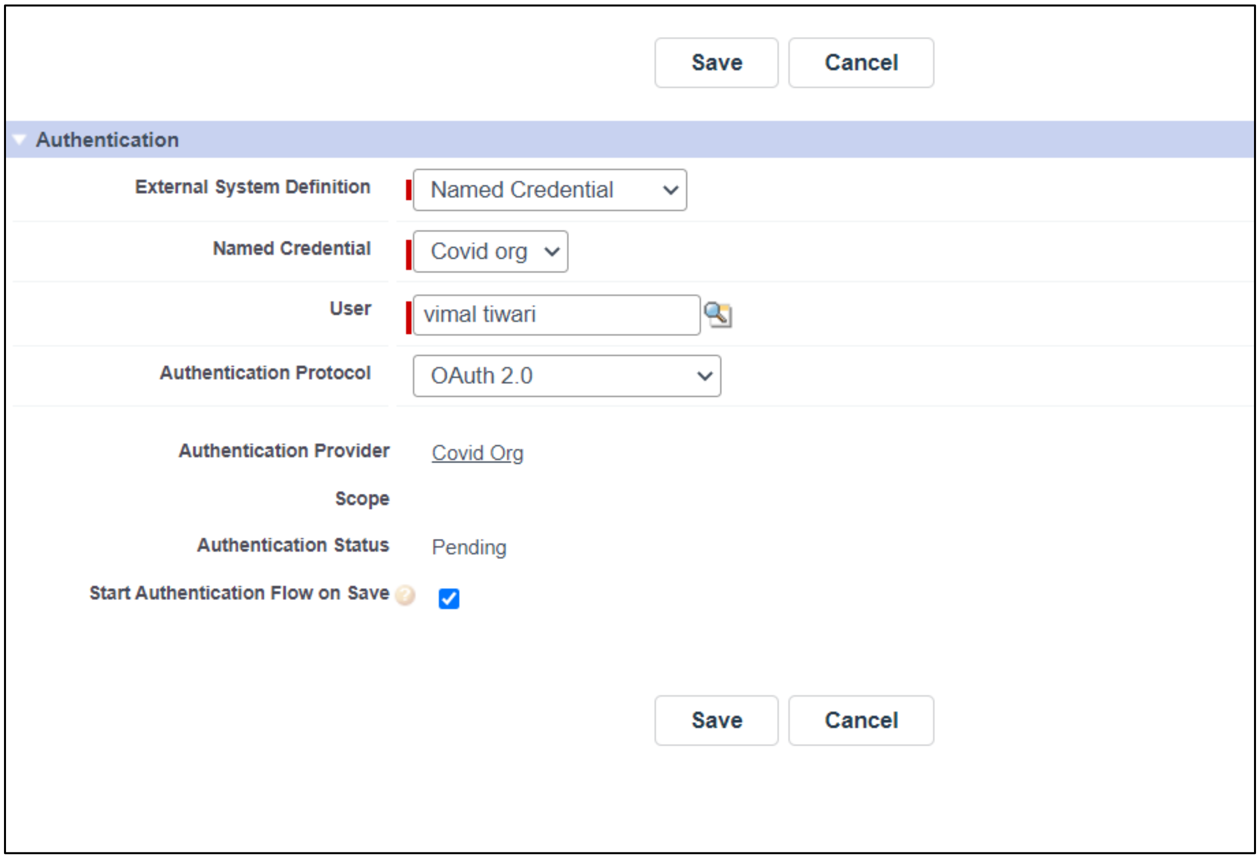
Authentication

Certificate	
Identity Type	Per User
Authentication Protocol	OAuth 2.0
Authentication Provider	Covid Org
Scope	
Administration Authentication Status	Pending

Callout Options

Generate Authorization Header	✓
Allow Merge Fields in HTTP Header	
Allow Merge Fields in HTTP Body	
Outbound Network Connection	

4. Give Access of Named Credential to Users – I have used Permission set.
5. Authentication Settings for External Systems
    a. Go to my settings -> personal -> Authentication Settings for External Systems
    b. Click new , add NC as external system definition.



External System Definition	Named Credential
Named Credential	Covid org
User	vimal tiwari
Authentication Protocol	OAuth 2.0
Authentication Provider	Covid Org
Scope	
Authentication Status	Pending
Start Authentication Flow on Save	✓

6. It's time to write some apex code and do some fun.
   Create new class AccountRestClient. And use its methods to get and put data.

Reference :

https://www.jitendrazaa.com/blog/salesforce/login-to-salesforce-from-salesforce-using-authentication-provider/#more-4516

https://developer.salesforce.com/docs/atlas.en-us.apexcode.meta/apexcode/apex_callouts_named_credentials.htm

https://salesforce.stackexchange.com/questions/102484/use-of-named-credentials-seem-to-be-tied-to-external-data-source