OAUTH 2.0 SECURE WEB SERVICES

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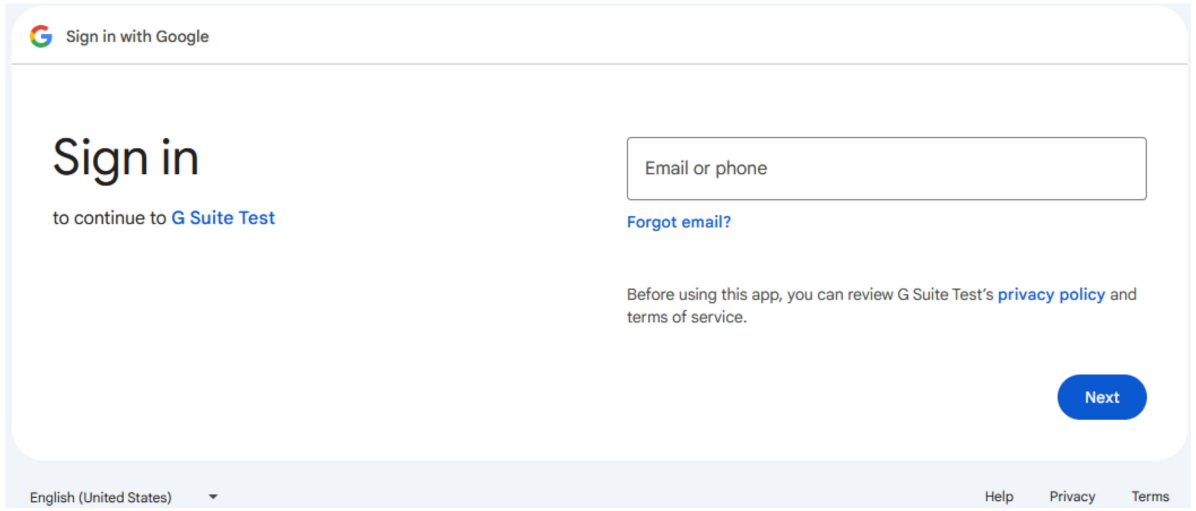
- **OAuth 2.0 is the modern standard for securing access to Web services**
- **Allows you to get authorized with Web services, such as Google, Salesforce or any Web service that uses OAuth 2.0**
- **Example: An application wants to be able to upload and download a file to a Google Drive**
  - Oauth 2.0 is used by the application to get the user to sign in to their Google account and allow their application access to their Google drive



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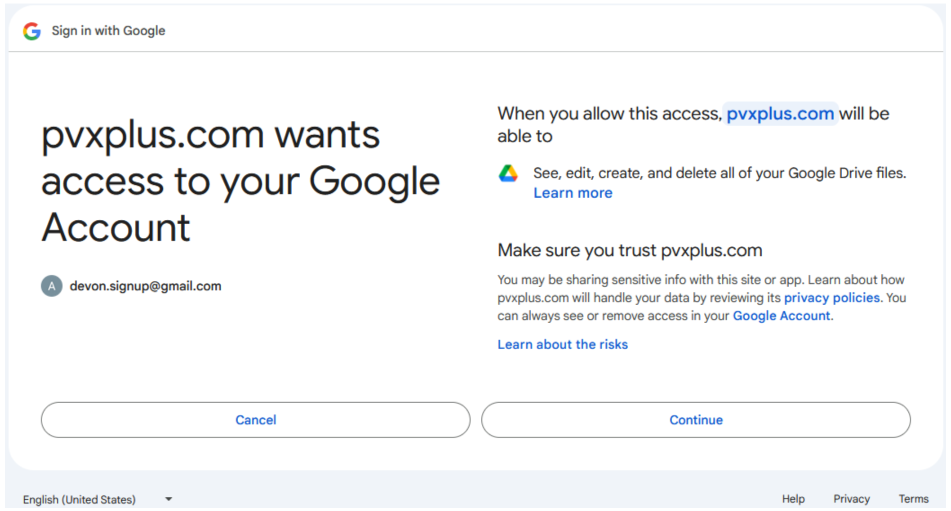

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- **Two types of OAuth 2.0 to consider**
  - Grant type
    - **client_credentials** - simpler and can be handled with a simple Web request to the token endpoint URL
      - Adds extra layer on top of username and password that is needed for web service access
      - This layer can be modified/revoked at any time separate to username and password
    - **authorization_code** - requires user to allow access via Web browser
      - Adds same extra layer as above with same benefits
      - Adds another extra layer where a user has to manually allow the application access
      - The application can ask for specific access and the user can pick and choose which they grant
      - Supports refresh tokens to avoid asking the user every time

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- **You set up a User ID/Client with the Web service provider and they will provide you with a Client ID and a secret code, as well as one or two URLs (these may be the same)**
  - Authorization endpoint URL (request URL for users to allow access)
  - Token endpoint URL (get access/refresh token)

- **To access an OAuth 2.0 restricted Web service, an access token must be acquired and then passed in with the header of the Web service request**
  - Access tokens expire, and once expired, a new access token must be requested to make a new Web service request
  - This token must be included in the HTML header for any subsequent requests

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How to get access token for grant type client_credentials

- **Make an HTTP POST request to the token endpoint of the OAuth 2.0 Web service you want access to**
  - The header of the request must include "Authorization: Basic " followed by the BASE64 encoded Client ID and Client secret separated by a : (colon)
  - The body of the request must be "grant_type=client_credentials"
  - The response from a successful request is a 200 status in the response header and the access token via a JSON response

```
{
  "access_token": "Access-Token",
  "token_type": "Bearer",
  "expires_in": 3600
}
```

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Example

```
clientId$="xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"
clientSecret$="xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"
call "*WEB/BASE64;ENCODE_STR",clientId$+":"+clientSecret$,usrpsw$
extrahdr$="Authorization: Basic "+usrpsw$
reqData$="grant_type=client_credentials"
call "*plus/web/request","https://www.exsrvr.com/oauth2/token",reqData$,resp$,resphdr$,"","",extrahdr$
dim load jsonAuth${all}=resp$
accessToken$=jsonAuth$["access_token"]
```

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How to get access token for grant type authorization_code

- **The First stage is to have the user grant your application access to an account of the provider (e.g. grant your application access to a Salesforce account)**
- **If you have done this step before and saved the Refresh token, you can skip this step**
- **First stage steps are:**

1. The application identifies itself to the provider, giving it the Client ID and secret code
2. The service provider returns PVX Plus a URL that the user must go to in order to authorize access
3. The user authorizes access to the provider via a Web browser

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How to get access token for grant type authorization_code

- **The Second stage is where you request an access and refresh using the token endpoint of the OAuth 2.0 Web service you want access to**
- **Second stage steps are:**

1. Request an Access token and a Refresh token from the web service provider using the Token_URL$
2. If this is the first time, save the Refresh token to avoid logging in the next time

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- **The "*obj/oauth2" object handles OAuth 2.0 grant type authorization_code for you**
- **The object has a few predefined services so you don't have to specify the authorization and token URLs**
  - Google
  - Salesforce
  - If accessing a non-predefined service, just specify URLs via the **Authorization_URL$ and Token_URL$ properties**
- **Properties used to set ClientID$ and client_secret$**
- **Methods used to perform first and second stage of authorization**
  - First stage:
    - **Enable_Certification(msg$)**
      - msg$ will be the message that appears on the authorization accepted screen
    - **Get_Authorization_URL$(scope$, prompt$)**
      - scope$ is used by some Oauth 2.0 servers when they define multiple scopes of access to specify what access they require
      - prompt$ specifies whether the user is prompted and for what when they request authorization **https://developers.google.com/identity/openid-connect/openid-connect#prompt**
  - Second stage: **Get_Access_token()**

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- **The First stage requires an OAuth 2.0 agent to process the user authorization**
  - This *obj/oauth2 object, by default, points to a PVX Plus Technologies hosted OAuth 2.0 agent
    - https://www.pvxplus.com/oauth.pvp
  - You may need to register the agent URL used with the Web service so that it knows it is safe to redirect to that URL
    - This is usually done from a Web browser via a site provided by the Web service
  - It is also possible to self-host the OAuth 2.0 agent
    - Self-hosting may be desirable if you want to avoid relying on the PVX Plus servers being up or if you want to keep it in house for security
    - To Self-host
      - Have a web server setup that can run PxPlus programs
      - Copy the files from the *web/services/oauth2/agent directory to the Web server docroot directory
      - Set the **Agent_URL$** property to my_server_url/oauthagent.pvp

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Example

```
clientId$="xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"
clientSecret$="xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx“
oAuth2=new("*obj/oauth2")
oAuth2'Service$="google"
oAuth2'client_id$=clientID$; oAuth2'client_secret$=clientSecret$
if refreshToken$="" then {
oAuth2'Enable_Certification("Do you consent to allow access of your Google account to example app?")
wait 1
url$=oAuth2'Get_Authorization_URL$("https://www.googleapis.com/auth/drive","consent select_account")
system_help url$
input "Press any key to continue after logging into account and allowing PxPlus access:",*;print ""
} else { oAuth2'Refresh_token$=refreshToken$ }
oAuth2'Get_Access_token()
refreshToken$=oAuth2'Refresh_token$
accessToken$=oAuth2'Access_token$
drop object oAuth2
```

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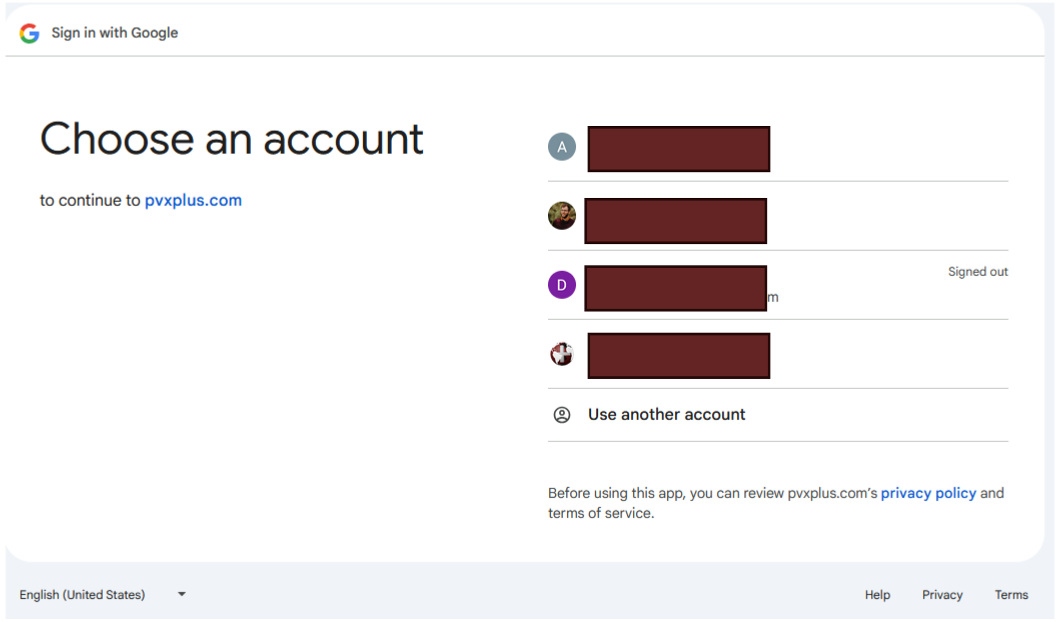

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A [redacted]

[redacted]

D [redacted]m Signed out

[redacted]

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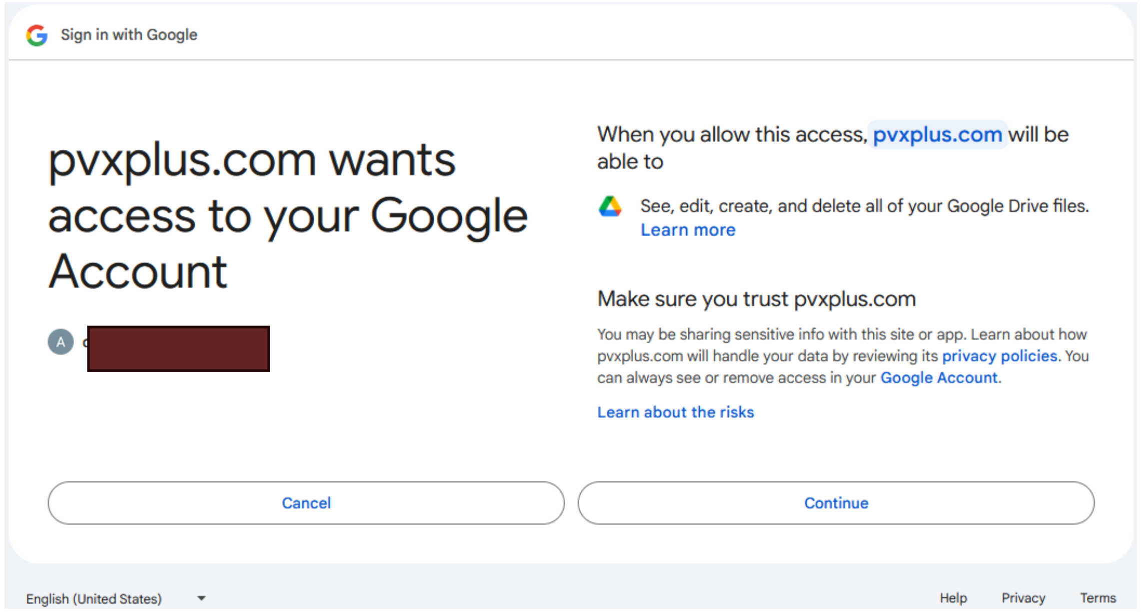

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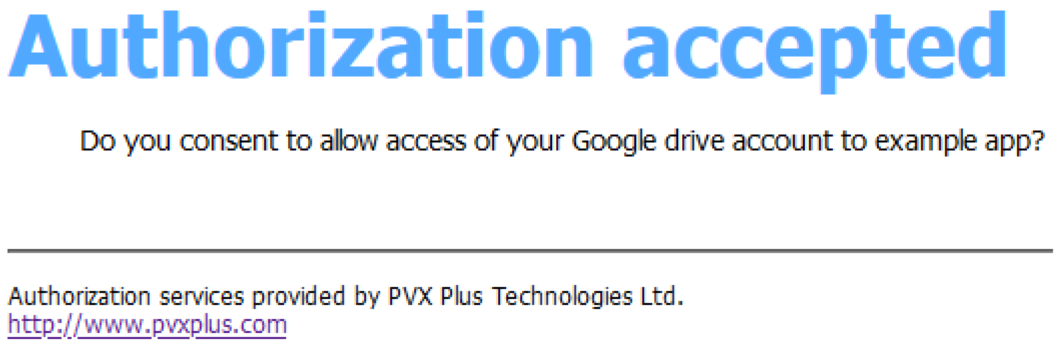

Authorization accepted

Do you consent to allow access of your Google drive account to example app?

Authorization services provided by PVX Plus Technologies Ltd.
http://www.pvxplus.com

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Make Request with Access Token

- **Either way you acquire an Access token making the Web request is the same**
- **Request the Web service with an "Authorization: Bearer " followed by the Access token in the header**
  - The Web service request is otherwise the same as a request to a Web service with no OAuth2 security

```
authHdr$="Authorization: Bearer "+accessToken$
call "*plus/web/request","https://www.exsrvr.com/exService","",resp$,resphdr$,"","",authHdr$
```

OAUTH 2.0 SECURE WEB SERVICES

- **PxPlus provides some built-in Web Services**
  - Query
  - Chart
  - Report
  - File Maintenance
  - File Access
- **OAuth2 security can be added to restrict access to PxPlus Web Services**
  - First, OAuth2 clients must be defined using either OAuth2 Client Maintenance or the OAuth2 Clients Object
  - Next, access is restricted either via NOMADS security on a query or report or by security enabled in Web Services Maintenance
- **The grant type is client_credentials and the token URL is pxplusServer/services/oauth2/token.pxp**

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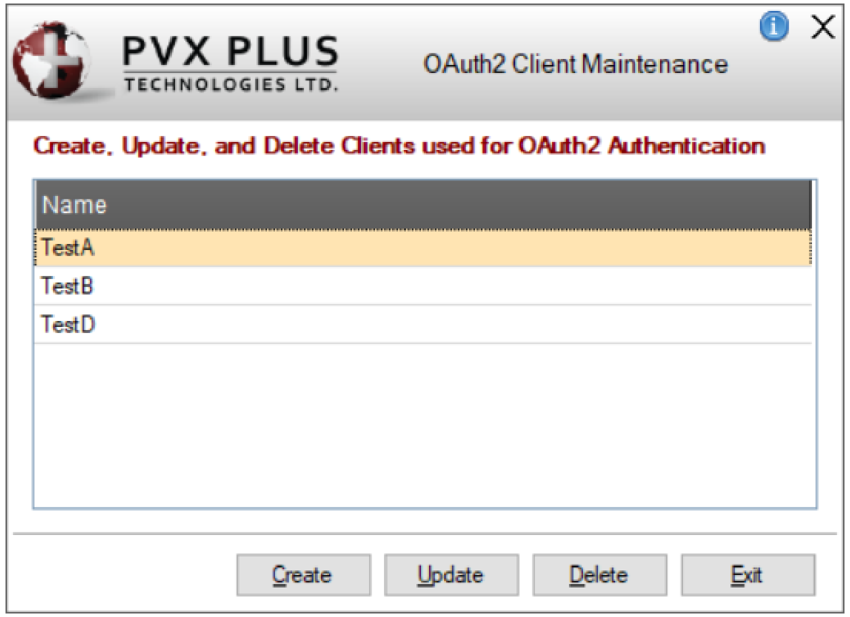
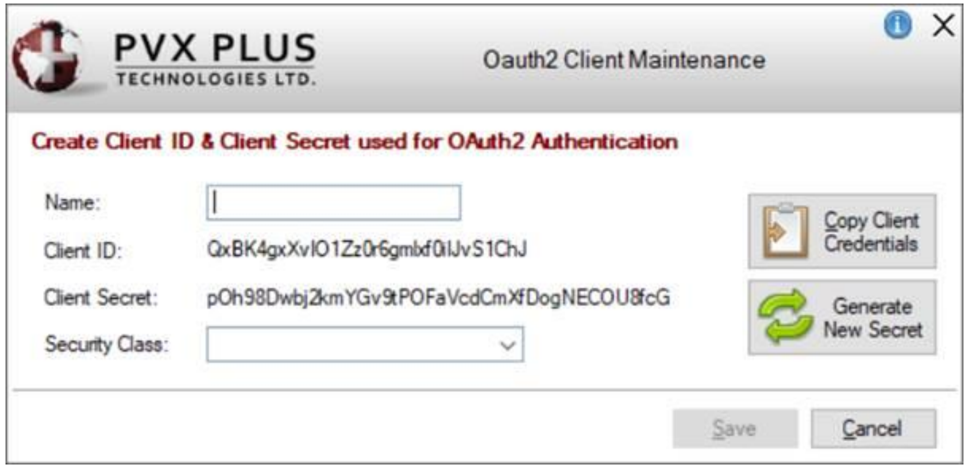
- **You must first set up Security Classifications and at least an ADMIN User in User Maintenance prior to setting up OAuth2 clients**
- **OAuth2 Client Maintenance is used for adding and maintaining OAuth2 clients**
  - OAuth2 clients are required to access PxPlus Web Services that have access restricted either via NOMADS security on the query or report or by security enabled in Web Services Maintenance
- **OAuth2 allows for strong security by properly managing clients**
  - If a user's system has been compromised, you can change the Client secret, thus revoking the compromised credentials access
  - If a user no longer needs access or access needs to be revoked, the client can be deleted, thus revoking the user access
  - OAuth2 clients can be managed programmatically and/or without a graphical user interface using the **OAuth2 Clients Object**


PVX PLUS TECHNOLOGIES LTD. OAuth2 Client Maintenance

Create, Update, and Delete Clients used for OAuth2 Authentication

Name
TestA
TestB
TestD


PVX PLUS TECHNOLOGIES LTD. Oauth2 Client Maintenance

Create Client ID & Client Secret used for OAuth2 Authentication

Name:
Client ID: QxBK4gxXvIO1Zz0r6gmbf0iIJvS1ChJ
Client Secret: pOh98Dwbj2kmYGv9tPOFaVcdCmXfDogNECOU8fcG
Security Class:

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- OAuth 2.0 Clients Object **(*web/services/oauth2/clients)**
  - Maintain OAuth 2.0 clients programmatically and without the need for a user interface
  - Generate and validate Access tokens

```
! Create a new Oauth 2.0 client
oauth2_clients=new("*web/services/oauth2/clients",adminUsername$,adminPassword$)
read data from oauth2_clients'SaveNewClient$("ABC Shipping", "USER") to client_Id$,client_Secret$,access_Token_Key$
```

```
! Revoke Access to Compromised Client by Changing Client Secret
oauth2_clients=new("*web/services/oauth2/clients",adminUsername$,adminPassword$)
read data from oauth2_clients'GetClient$("ABC Shipping") to client_Id$,client_Secret$,access_Token_Key$,security_Class$
oauth2_clients'SaveClient("ABC Shipping", client_Id$, oauth2_clients'NewClientSecret$() ,access_Token_Key$,security_Class$)
```

OAUTH 2.0 SECURE WEB SERVICES

- **Add OAuth2 Security to PxPlus-built Web Service**
- **The grant type is client_credentials and the token URL is pxplusServer/services/oauth2/token.pxp**
  - Provide this to the consumers of your Web service
- **It is possible to implement your own OAuth2 Access token server using the OAuth2 Clients Object if the one provided with PxPlus does not meet an application's requirements**
- **Use the OAuth 2.0 Clients Object in the code for your Web service to validate Access token**

```
if len(%http_authorization$)>=7 and lcs(mid(%http_authorization$,1,7))="bearer " {
    base64AccessToken$=stp(mid(%http_authorization$,8,err=Return_auth_err),"B")
    accessToken$=cvs(base64AccessToken$,"BASE64URL:ASCII",0)
    oauth2clients=new("*web/services/oauth2/clients",err=return_auth_err)
    if oauth2clients'ValidateAccessToken$(accessToken$)="" then goto return_auth_err
    drop object oauth2clients,err=*next
 }
```