One Identity Manager On Demand (Starling Edition) 9.2

API Development Guide

Contents

About this guide

This guide explains the API Server's functionality, how you program API calls, and add your own API methods to One Identity Manager On Demand (Starling Edition).

Available documentation

The online version of One Identity Manager documentation is available in the Support portal under Technical Documentation. You will find videos with additional information at www.YouTube.com/OneIdentity.

Basic principles of API development

HTML applications use the API Client to communicate with the One Identity Manager API. The API Client controls all network access on the API Server.

The most important components for developing your own APIs are:

- API projects: An API project represents the actual application and provides API methods. Various API projects are supplied with One Identity Manager On Demand (Starling Edition), for example the Web Portal (**portal**).

- API plug-ins: An API plug-in serves as a container for custom extensions. With an API plug-in, you can deploy your own API projects and/or add more API methods to existing API projects.

- API Provider: An API provider is a single class in a DLL file that declares API methods.

Detailed information about this topic

API Server basics

In this chapter you will find basic information about the API Servers architecture, which is important for custom programming with your own API methods.

Detailed information about this topic

General information about the API Server

- The API Server deploys the API.
- The API Server is implemented using the Owin Platform (see http://owin.org/).
- URLs are case sensitive.

Calling the API Server web interface

From the API Server's web interface you can:

- Configure the API Server.
- Call the swagger documentation for your API.
- Open the Operations Support Web Portal.
- Call all installed web applications.

To call the API Server web interface

- In a web browser, open the webpage (URL) of your API Server.

Encryption

The API Server stores data securely encrypted on the client.

The certificate is configured when the API server is installed on the IIS. For more information on installing the API Servers, see the *One Identity Manager Installation Guide*.

For more information about configuring encryption, see the *One Identity Manager Web Application Configuration Guide*.

General notes on programming your own API methods

- Because the API Server is stateless, save the API methods without a client specific state.
  For example, you cannot, therefore, define global variables or store session object status data. When the API Server processes are restarted, these values are not restored.
- After enabling routes, you cannot change the definition objects anymore.

- Use asynchronous code for defining API methods. This supports more efficient usage of server resources and improves performance of the system under load. The methods of the API and the underlying object model convert this asynchronously using the Task-based Asynchronous Pattern (TAP). For more information about TAP, see here.

- Do not use the **HttpContext.Current** method when you define API methods. You can query the current HTTP requirements with the **QBM.CompositionApi.OwinRequestScopeContext.Context.Current** static method.

- If you define API methods that modify data, do NOT use the **GET** method.

Guidelines and conventions

In this chapter, you will find general policies and conventions, which you must take into account when you create an API.

Detailed information about this topic

Handling of API Server queries

In this section, you will find information about handling queries that are sent to the API Server.

Authentication

When a query is sent to the API Server, there is a test to ascertain the success of the primary and, possibly, secondary login in the session for the current project (see

Authentication on page 10).

> NOTE: This test is not done if the API method used by the query is marked as **AllowUnauthenticated**.

The **imx-session-<API project name>** cookie is evaluated to allocate the current session.

If a cookie is passed that cannot be associated with an active session in the current process, the security token in the cookie is used to set up a new session (see Session status and security tokens on page 11).

If there is no primary login, the API Server tries to establish a database connection through one of the enabled single sign-on authentication modules.

If login cannot be carried out, the process is canceled and the HTTP error code **500** is passed to the client (see Response codes on page 21).

Authorizing method access

The API Server checks whether the currently logged in user is authorized to run the method. If the user does not have the required permissions, the process is canceled and the HTTP error code **500** is passed to the client (see Response codes on page 21).

Validating the query

The API Server calls the validators stored with the API method one by one. If one fails, the process is canceled and the HTTP error code **400** is passed to the client (see Response codes on page 21).

Processing queries (for entity methods)

- GET (loads an entity)
    - Determines the WHERE clause with internal and external filters
    - Loads data from the database
    - Augments an entity with calculated columns
- An entity in delayed-logic mode can be changed with a POST query or deleted with a DELETE query. An entity in this mode is stateless and does not take up any resources on the server after it has been processed.
Supported HTTP methods:
    - GET (reads an entity)
    - POST (changes an entity)
    - DELETE (deletes an entity)
- An interactive entity must be created once with a PUT query and after that they obtain their own ID. Use the ID in subsequent queries (POST or DELETE).

    Supported HTTP methods:

- GET (loads an entity)
- PUT (creates an interactive entity)
- POST (changes an interactive entity)
- DELETE (deletes an interactive entity)

Authentication

User authentication is carried out on the API Server for each API project.

Running an API method requires prior authentication on an API project. If the API method is marked as `AllowUnauthenticated`, authentication is not required (you can find an example in the SDK)

Authentication has two steps:

1. Required primary authentication: Default authentication through an authentication module
2. Optional secondary authentication: Multi-factor authentication (using OneLogin)

For more information about configuring authentication, see the *One Identity Manager Web Application Configuration Guide*.

Detailed information about this topic

- Authentication (primary) on page 11
- Logging out on page 11

Related topics

- Handling of API Server queries on page 8

Configuring authentication

You can specify how users authenticate themselves on your API. You configure authentication in the API project.

To configure authentication

1. Edit your API project.
2. Create the **SessionAuthDbConfig** class and populate the following properties:
   a. **Product**: Specify the application with the authentication module that you want to use (for example the **WebDesigner** or the **Manager**),
   b. **SsoAuthentifiers**: Specify the single sign-on authentication modules to use.
   c. **ExcludedAuthentifiers**: Specify the authentication modules not to use.

Authentication (primary)

You can use the **imx/login/<API project name>** API method for primary authentication on the API project.

To do this, use the **POST** HTTP method to send a query containing the following:

`{ "Module": "RoleBasedPerson", "User": "<user name>", "Password": "<password>" }`

TIP: See the SDK for examples.

Security mechanisms

The API Server uses a security mechanism to prevent cross-site request forgery (XSRF) attacks. This randomly generates a token (**XSRF-TOKEN**) and sends it to the client in a cookie at login. The client must then transmit the value of this token in an HTTP header (**X-XSRF-TOKEN**) in each request sent to the server. If this header is missing, the request is terminated with error code **400**.

NOTE: If an API request breaks off with an error and indicates an incorrect CSRF protection cookie, check if your browser accepts the cookies sent by the browser.

TIP: You can change the name and path of the cookie and the name of the HTTP header in the Administration Portal. To do this, use the **Name of the cookie containing the CSRF protection token issued by the server** (**XsrfProtectionCookieName**) and **Path for the CSRF protection cookie** (**XsrfProtectionCookiePath**) configuration keys.

You can also disable CSRF protection in the administration portal (**Globally disable CSRF protection tokens** (**XsrfProtectionDisabled**) configuration key). One Identity does not recommend doing this.

For more information about editing configuration keys, see the *One Identity Manager Web Application Configuration Guide*.

Logging out

You can use the **imx/logout/<API project name>** API method to log out of the API project.

To do this, use the **POST** HTTP method to send a query without content.

Session status and security tokens

The status a session is saved in a cookie. This cookie contains an encrypted security token which is used to restore a login to the API Server if the API Server was restarted in the mean time. The security token is cryptographically signed by the certificate selected on installation.

NOTE: If the API Server's current user restarts the browser, the cookie and its session information are reset.

Related topics

Querying session status

You can use the **imx/sessions/<API project name>** API method to query the status of the session. The response contains the following information:

- Permitted authentication module and associated parameters of the respective API project.
- Type of secondary login

API methods

You can define the following types of API methods.

- Entity methods
- User-defined methods
- SQL methods

Detailed information about this topic

Entity methods

Entity methods work with small parts of the object model in order to read data from the database or write data to the database. When you create an entity method, you only need to enter the table and column name and, if required, a filter condition (WHERE clause). Internal processing is handled by the API Server. The data schema for the input and output also has a specific format.

For examples for the definition of entity methods, see the SDK under `Sdk01_Basics\01-BasicQueryMethod.cs`.

Detailed information about this topic

Notes

- Do not declare path parameters in the URL of entity methods that support operations of type **Update** or **Create**.

Limiting results

NOTE: Entity-based methods normally work with a limit to avoid unintentionally loading extremely large amounts of data.

The following query parameters help you to limit the amount of data that is returned by obtaining multiple data sets from sequential responses:

Query parameter	Default value	Description
PageSize	20	Specifies the maximum number of data sets that can be contained in the response. If you only determine the total number and do not want to obtains single data sets, use the value **-1**.
StartIndex	0	Specifies as from which data sets the results are returned in the response. This parameter is null-based (the first element is addressed with the value **0**).

Example

The following query returns 50 identities and starts with the 101st identity:

```
https://<Host-Name>/ApiServer/portal/person?PageSize=50&StartIndex=100
```

Sort order

Use the **Orderby** query parameter to sort the results returned in an response. This parameter allows you to sort the column names of the underlying database table.

> **Examples**
>
> The following query returns identities sorted by first name in ascending order:
>
> `https://<Host-Name>/ApiServer/portal/person?OrderBy=FirstName`
>
> The following query returns identities sorted by first name in descending order:
> `https://<Host-Name>/ApiServer/portal/person?OrderBy=FirstName%20DESC`

Filtering

Use the **filter** query parameter to filter the results returned in an response. A filter like this consists of a JSON formatted string that must contain the following:

- **ColumnName**: Name of the column used to filter
- **CompareOp**: The operator for comparing the contents of the selected column with the expected value

  The following comparison operators are permitted:

  - **Equal**: The results only include data sets with column data that matches the comparison value.
  - **NotEqual**: The results only include data sets with column data that does NOT match the comparison value.
  - **LowerThan**: The results only include data sets with column data less than the comparison value.
  - **LowerOrEqual**: The results only include data sets with column data less than or equal to the comparison value.
  - **GreaterOrEqual**: The results only include data sets with column data greater than or equal to the comparison value.
  - **Like**: Requires the use of a percent sign (%) as a placeholder. You can enter up to two percent signs in this value. The results only include data sets with column data that matches the comparison value pattern.
  - **NotLike**: Requires the use of a percent sign (%) as a placeholder. You can enter up to two percent signs in this value. The results only include data sets with column data that does NOT match the comparison value pattern.
  - **BitsSet**: The value is compared to the comparison value using the AND (&) logical operator. The result must not be equal to 0.
  - **BitsNotSet**: The value is compared to the comparison value using the AND (&) logical operator. The result must be equal to 0.

- **Value1**: Comparison value for comparing the contents of the column
- **Value 2**: If this second comparison value is passed down, the value of **CompareOp** is ignored and all the values that are greater or equal to **Value1** and less or equal to **Value2** are determined.

Example

The following query returns all identities with the last name "User1":

```
https://<Host-Name>/ApiServer/portal/person/all?filter=[{ColumnName:
'LastName', CompareOp: 'Equal', Value1: 'User1'}]
```

Grouping

You can use the **group** path parameter to group the results returned in a response. You can use the **by** query parameter to specify which attribute to use for grouping. Furthermore, you can use the **withcount** query parameter to specify (values: **true** or **false**) whether to calculate the number of objects for each group. This may increase the runtime.

NOTE: The API method must support grouping (by using the **EnableGrouping** parameter).

The result of the query contains a filter condition that you can pass to the URL parameter as filter.

Example

The following queries determine the number of identities grouped by primary location:

```
https://<host name>/ApiServer/portal/person/all/group?by=UID_
Locality&withcount=true
```

Response:

```
{
    {
        "Display": "(No value: Primary location)",
        "Filters": [
            {
                "ColumnName": "UID_Locality",
                "CompareOp": 0
            }
        ],
        "Count": 42
    },
    {
        "Display": "Berlin",
```

```
        "Filters": [
            {
                "ColumnName": "UID_Locality",
                "CompareOp": 0,
                "Value1": "c644f672-566b-4ab0-bac0-2ad07b6cf457"
            }
        ],
        "Count": 12
    }
}
```

Hierarchical data structure

Some data model tables are defined as hierarchical structures (**Department** for example). Data from such tables is loaded from a specific hierarchy level.

You can use the **parentKey** query parameter of the parent object to specify the hierarchy level.

Example

The following query determines the service categories directly below the **Access Lifecycle** service category:

`https://<host name>/ApiServer/portal/servicecategories?parentKey=QER-f33d9f6ec3e744a3ab69a474c10f6ff4`

The following query determines the service categories that do not have a parent service category:

`https://<Host-Name>/ApiServer/portal/servicecategories?parentKey=`

The following query determines all service categories regardless of their hierarchy:

`https://<Host-Name>/ApiServer/portal/servicecategories`

You can use the **noRecursive** path parameter to specify whether the data is queried as a flat list (values: **true** or **false**).

Example

`https://<Host-Name>/ApiServer/portal/servicecategories?noRecursive=true`

Additional query parameters

You can use the **withProperties** query parameter to specify whether additional information from specific tables columns are returned in the response.

NOTE: To enable table columns for these queries, set the **Show in wizards** option in the column properties of the relevant columns in the Designer.

TIP: You can delimit the names of multiple columns with commas.

Example

The following query determines the number of all identities and also returns their preferred name and title:

```
https://<host
name>/ApiServer/portal/person/all?withProperties=PreferredName,Title
```

Response:

```
{
    "TotalCount": 105950,
    "TableName": "Person",
    "Entities": [
        {
            "Display": "100, User (USER1)",
            "LongDisplay": "100, User (USER1)",
            "Keys": [
                "bbf3f8e6-b719-4ec7-be35-cbd6383ef370"
            ],
            "Columns": {
                "DefaultEmailAddress": {
                    "Value": "USER1@qs.ber",
                    "IsReadOnly": true
                },
                "IdentityType": {
                    "Value": "Primary",
                    "IsReadOnly": true,
                    "DisplayValue": "Primary identity"
                },
                "PreferredName": {
                    "Value": "Johnny",
                    "IsReadOnly": true
                },
                "Title": {
                    "Value": "Dr.",
                    "IsReadOnly": true
                },
                "XObjectKey": {
                    "Value": "<Key><T>Person</T><P>bbf3f8e6-b719-4ec7-be35-
cbd6383ef370</P></Key>",
                    "IsReadOnly": true
                }
```

```
                    }
        }
```

Type-safe classes

Type-safe classes allow you to use the database model in a type-safe way. This gives you the following advantages:

- Compiling scripts checks whether the classes used are correct. This allows you to detect spelling mistakes in table and column names early on.
- The development environment can offer auto-completion.
- The column's data type is detected, which prevents type conversion errors.

To use type-safe classes

1. Edit the corresponding API plug-in (see Editing API plug-ins on page 25) and proceed as follows:

   - Add a reference to the type-safe class library of the corresponding database module (`AOB.TypedWrappers.dll` for example).

     This makes the classes for this module available in the `<module name>.TypedWrappers` namespace (`AOB.TypedWrappers` for example).

User-defined methods

User-defined methods are methods for which you fully define the processing, input, and output data in code. This type therefore offers the greatest flexibility.

For examples for the user-defined methods, see the SDK under `Sdk01_Basics\03-CustomMethod.cs`.

SQL methods

SQL methods are methods that provide data from a predefined SQL query through the API. Create the parameters of a query as SQL parameters.

For examples for the definition of SQL methods, see the SDK under `Sdk01_Basics\02-BasicSqlMethod.cs`.

Detailed information about this topic

- Entity methods on page 12

HTTP methods

HTTP requests can apply the following HTTP methods:

- **GET**: This method requests data from the application server.
- **PUT**: This method changes data on the application server.
- **POST**: This method creates data on the application server.
- **DELETE**: This method deletes data on the application server.

Date formats

Date values in requests to change or add objects must be specified in ISO 8601 format in the client's local time zone.

> **Example**
>
> 2016-03-19T13:09:08.123Z

Related topics

- Parameter formats on page 19

Parameter formats

HTTP requests use the following types of parameters:

- Path parameters
- Query parameters

Related topics

- Date formats on page 19

Path parameters

Path parameters extend the URL path. A forward slash is used as the delimiter.

If a query uses a path parameters, they are given in URI format.

Example

```
https://<host name>/ApiServer/imx/sessions/exampleparameter
```

Query parameters

Query parameter are appended to the URL with a question mark (?) or an ampersand (&).

The first query parameter must be prefixed by a question mark. In this case, you must use the following format:

`?parameter name=parameter value (for example, ?orderBy=LastName)`

Subsequent query parameters must be prefixed by an ampersand. In this case, you must use the following format:

`&parameter name=parameter value (for example, ?sortOrder=ascending)`

NOTE: Unknown query parameters are rejected by the server with error code **400**. This also affects query parameters with incorrect upper and lower case spelling.

Example

```
https://<host name>/AppServer/portal/person?orderBy=LastName
```

Response formats

Most API methods return results in JSON format (application/json). Furthermore, there is support for results in CSV and PDF format as long as the result of the respective API method is declared as exportable (with the **AllowExport** flag). Basically, an API method can return results in any format compatible with HTTP.

To obtain results in CSV format

- In the query, set **Accept header** to **text/csv**.

To obtain results in PDF format

- In the query, set **Accept header** to **application/pdf**.

  NOTE: To obtain results in PDF format, the **RPS** module must be installed on your system.

Related topics

- Response codes on page 21

Response codes

Responses that are sent from the REST API use the following codes. If queries fail, an explanatory error message is displayed.

Response codes	Description
200	Query successful.
204	Query successful. Response has no content.
401	Access not authorized. The session must be authorized first.
404	The given resource could not be found.
405	The HTTP method used is not allowed for this query.
500	A server error occurred. The error message is sent with the response. On the ground of security, a detailed error message is not included in the response. For more information, see the application log file on the server.

Related topics

Avoiding deadlocks

API development includes a lot of asynchronous code with async/await constructs. To avoid deadlocks, use the **ConfigureAwait(false)** method for every **await** keyword.

For more information, see here and here.

Examples and help – Software Development Kit

To make it easier for you to start developing your API, One Identity provides a Software Development Kit (SDK) with lots of commented code example.

The SDK can be found on the installation medium in the directory `QBM\dvd\AddOn\ApiSamples.`

Implementing your own APIs

To implement your own APIs, you can create API plug-ins.

The API Server loads all DLLs matching the `*.CompositionApi.Server.PlugIn.dll` naming scheme and deploys the API definitions contained in them.

To implement your own APIs, the following options are available:

- You can add an API to a One Identity API project (see Adding APIs to One Identity API projects on page 26).

- You can create your own API project (Creating API projects on page 28).

- You can add an API to your own existing API projects (see Adding APIs to your own API projects on page 28).

Detailed information about this topic

- Managing API plug-ins on page 23
- Adding APIs to One Identity API projects on page 26
- Creating API projects on page 28
- Adding APIs to your own API projects on page 28

Managing API plug-ins

With the help of API plug-ins, you can implement and use your own customized APIs and API projects.

Prerequisites:

- You use a version management system (for example, Git).

- You use an Integrated Development Environment (IDE).

Detailed information about this topic

Creating API plug-ins

To implement your own customized APIs and API projects, you can create API plug-ins.

To create an API plug-in

1. Start your IDE (such as Visual Studio).

2. Create a new .NET Framework 4.8 project with a name that complies with the format: `<project name>.CompositionApi.Server.Plugin`.

3. Add references to the following DLL files from the One Identity Manager installation directory:

   - `QBM.CompositionApi.Server.dll`
   - `VI.Base.dll`
   - `VI.DB.dll`

4. Create the API code.

5. Compile the DLL file in your IDE.

6. Copy the DLL file to the `bin` subdirectory of your IIS installation.

7. Import the DLL file into your One Identity Manager database using the Software Loader and assign it to the **Business API Server** machine role. For more information on importing files using the Software Loader, see the *One Identity Manager Operational Guide*.

8. Copy the DLL file to the One Identity Manager install directory.

9. Import the DLL file into your One Identity Manager database using the Software Loader and assign it to the **Development and Testing** machine role. For more information on importing files using the Software Loader, see the *One Identity Manager Operational Guide*.

10. Restart the API Server and ensure that the `<project name>.CompositionApi.Server.Plugin` file exists in the `bin` folder of the API Server install directory.

11. Compile the appropriate TypeScript API client (see Compiling TypeScript API clients on page 25).

Editing API plug-ins

You can edit existing API plug-ins.

To edit an existing API plug-in

1. Start your IDE (such as Visual Studio).
2. Open an existing .NET Framework 4.8 project.
3. Edit the API code.
4. Compile the DLL file in your IDE.
5. Copy the DLL file to the `bin` subdirectory of your IIS installation.
6. Import the DLL file into your One Identity Manager database using the Software Loader. For more information on importing files using the Software Loader, see the *One Identity Manager Operational Guide*.
7. Copy the DLL file to the One Identity Manager install directory.
8. Import the DLL file into your One Identity Manager database using the Software Loader. For more information on importing files using the Software Loader, see the *One Identity Manager Operational Guide*.
9. Restart the API Server and ensure that the `<project name>.CompositionApi.Server.Plugin` file exists in the `bin` folder of the API Server install directory.
10. Compile the appropriate TypeScript API client (see Compiling TypeScript API clients on page 25).

Compiling TypeScript API clients

After you create an API plug-in, you need to compile a corresponding TypeScript API client.

To compile a TypeScript API client

1. Open a command line interface (for example, Windows Powershell).
2. In the command line program, go to the One Identity Manager installation directory.
3. Run the ImxClient's **start-update** command (see start-update on page 42).

> **Example**
>
> ```
> imxclient start-update
> ```

4. Run the ImxClient's **compile-api** command (see compile-api on page 31).

> **Example**
>
> ```
> imxclient  compile-api  /copyapi  imx-api-ccc.tgz  /packagename  imx-
> api-ccc
> ```

The dialog to select the database connection is opened.

5. In the dialog, perform one of the following actions:

   - to use an existing connection to the One Identity Manager database, select it in the **Select a database connection** menu.

     - OR -

   - to create a new connection to the One Identity Manager database, click **Add new connection** and enter a new connection.

6. Select the authentication method and, under **Authentication method**, enter the login data for the database.

7. Click **Log in**.

8. Import the `imx-api-ccc` npm package into your TypeScript application.

   TIP: (Optional) If you want to use another name for the `imx-api-ccc` packet, extend the `remove-local-packages.js` by adding a line for the packet in the list. This ensures that your package is not included in package locking and is always updated from the local source.

9. Copy the `imx-api-ccc.tgz` to the `bin\imxweb` subfolder of your IIS installation.

10. Import the TGZ file into your One Identity Manager database using the Software Loader and assign it to the **Business API Server** machine role. For more information on importing files using the Software Loader, see the *One Identity Manager Operational Guide*.

11. Restart the API Server and ensure that the `imx-api-ccc.tgz` file is in the `bin\imxweb` folder of your IIS installation.

Related topics

- compile-api on page 31

Adding APIs to One Identity API projects

You can add your own APIs to One Identity API projects to add customized functionality to One Identity HTML applications. To do this, create an API plug-in, define the API in it and assign the corresponding One Identity API project to the API plug-in.

To add an API to a One Identity API project

1. Create or edit an API plug-in (see Creating API plug-ins on page 24 or Editing API plug-ins on page 25) and proceed as follows:

   a. Create a new class in the API plug-in project. This class represents the so-called API provider.

   b. Declare the class with the interface that belongs to the API project you want to add your API to.

      The following One Identity API projects can be added:

      Table 1: Supplied API project

HTML application name	API project name	Interface to implement
Web Portal	portal	`IApiProviderFor<QER.CompositionApi.Portal.PortalApiProject>`
Operations Support Web Portal	opsup- port	`IApiProviderFor<QBM.CompositionApi.Operations.OperationsApiProject>`
Administration portal	admin	`IApiProviderFor<QBM.CompositionApi.AdminApi.AdminApiProject>`
Password Reset Portal	passwor- dreset	`IApiProviderFor<QER.CompositionApi.Password.PasswordPortalApiProject>`

   c. Implement the **Build** method of the **IApiProviderFor** interface with the desired API functionality.

   Example

   ```
    1    public class ExampleApi : IApiPro-
         viderFor<QER.CompositionApi.Portal.PortalApiProject>
    2
    3    {
    4        public void Build(IApiBuilder builder)
    5        {
    6            builder.AddMethod(Method.Define("example")
    7                .AllowUnauthenticated()
    8                .HandleGet(qr => new DataObject { Message =
         "Hello world!" }));
    9        }
   10    }
   ```

Creating API projects

You can create your own API projects to add customized functionality to One Identity HTML applications. To do this, copy the **CustomApiProject** sample API project (see Examples and help – Software Development Kit on page 22), customize it as required, and assign it to an API plug-in.

To create your own API project

1. Copy the **CustomApiProject** sample API project.

2. Make changes to the copied API project as required.

3. Create an API plug-in (see Creating API plug-ins on page 24) and proceed as follows:

    - In the API plug-in project, create a new class that implements the **IApiProviderFor<name of your API project>** interface. This class represents the so-called API provider.

Adding APIs to your own API projects

You can add more APIs to your own API projects.

To add an API to your API project

1. Edit the API plug-in (see Editing API plug-ins on page 25) associated with the API project and proceed as follows:

    - In the API plug-in project, create a new class that implements the **IApiProviderFor<name of your API project>** interface. This class represents the so-called API provider.

ImxClient command line program

You can use the ImxClient command line tool to run different functions for managing the API Server and files on the command line.

Detailed information about this topic

- Starting the ImxClient command line program on page 29
- ImxClient command overview on page 29

Starting the ImxClient command line program

You can start the ImxClient command line tool at any time using any command line interface.

To start the ImxClient command line program

1. Open a command line interface (for example, Windows Powershell).
2. In the command line program, go to the One Identity Manager installation directory.
3. Run the `ImxClient.exe` application.

ImxClient command overview

The following chapters contain a list of all ImxClient commands that you can run.

Detailed information about this topic

- check-translations on page 30
- compile-api on page 31

check-translations

Searches for captions (multilingual text) with missing translations in a particular folder and its subfolders.

Parameters

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.
- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Required parameters:

- `/path <path to folder>`: Specifies the path to the folder you want to check.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:
    - `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.
    - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.

- `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.
- `/factory <target system>`: Specifies the target system for the connection. Enter this parameter if you want to establish a connection to the application server.
  Example: `QBM.AppServer.Client.ServiceClientFactory, QBM.AppServer.Client`

Related topics

compile-api

Compiles the API and saves the result to the database.

Parameters

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.
- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:
  - `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.
  - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.
  - `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.
- `/factory <target system>`: Specifies the target system for the connection. Enter this parameter if you want to establish a connection to the application server.
  Example: `QBM.AppServer.Client.ServiceClientFactory, QBM.AppServer.Client`
- `N`: Prevents saving to the database.
- `/modules <module1, module2>`: Specifies which modules are included. If you do not enter anything here, all modules are included. Enter the modules' names, delimited by commas.
- `/clientmodules <module1,module2,...>`: Specifies the modules for which API code is generated. If you do not enter anything here, API code is generated every module. Enter the packages' names, delimited by commas.

- /packagename <name>: Specifies the API client package name. The default value is imx-api.

- /copyapi <folder path>: Specifies where to copy the imx-api.tgz to.

- /nowarn <error1,error2,...>: Specifies which errors are ignored during compilation. Enter the codes for the warnings, separated by commas.

- /warnaserror <error1,error2,...>: Specifies which warnings are displayed as errors during compilation. Enter the codes for the warnings, separated by commas.

Related topics

compile-app

Runs HTML5 package compilation.

This command performs the following steps:

1. Runs the **npm install** command in the application folder.

2. Runs the **npm run build** command in the package folder.

3. Creates the output in subdirectory dist
   .The output is stored as a zip file in the database.

Parameters

Login parameter:

- /conn <database connection>: Specifies the database you want to connect to.

- /dialog <dialog authentication>: Specifies the dialog authentication.

Optional parameter:

- /conndialog <option>: Specifies whether a login window is displayed for the database connection. The following options are possible:

  - off: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.

  - show: The login window is shown (even is a database is already connected) and the new connection replaces the old one.

  - fallback (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.

- /factory <target system>: Specifies the target system for the connection. Enter this parameter if you want to establish a connection to the application server.
  Example: QBM.AppServer.Client.ServiceClientFactory, QBM.AppServer.Client

- `/workspace <path to working directory>`: Specifies the working directory. This folder contains the application to be compiled. This folder normally contains the `package.json` file of the application. If you do not enter anything here, the current directory is used.

- `/app <application project name>`: Specifies which application project to compile. If you do not specify anything here, all application projects are compiled.

- `-D`: Runs debug compilation.

- `-S`: Skips running the **npm install** command in the application folder.

- `-P`: Prevents libraries being build in the application folder.

- `/copyto <file path>`: Saves the result of the compilation as ZIP files in a folder.

- `/exclude <module name>`: Omits packages of a module at compile time (for example, **AOB**).

Related topics

connect

Establishes a database connection.

If a connection to a database has already been established, this is closed and a new connection is then established.

Parameters

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.

- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:
    - `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.
    - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.
    - `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.

- `/factory <target system>`: Specifies the target system for the connection. Enter this

parameter if you want to establish a connection to the application server.
Example: `QBM.AppServer.Client.ServiceClientFactory, QBM.AppServer.Client`

Related topics

edit-config

Configures a trusted source key for an application.

Parameter

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.
- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Required parameters:

- `/path <path to folder>`: Specifies which configuration file to load (for example, the `web.config` file of a web application). The **BaseURL** setting of this configuration file is used to determine the application to create the trusted source key for.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:
    - `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.
    - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.
    - `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.
- `-T`: Configures a random generated trusted source key for the application.
- `/trustedsourcekey <Trusted Source Key>`: Configures the given trusted source key for the application.

Related topics

fetch-files

Loads a specific machine role from the database and saves it in a local folder.

Parameters

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.
- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Required parameters:

- `/targets <target1;target2;...>`: Specifies which machine roles you want to use.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:
    - `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.
    - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.
    - `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.
- `/factory <target system>`: Specifies the target system for the connection. Enter this parameter if you want to establish a connection to the application server. Example: `QBM.AppServer.Client.ServiceClientFactory, QBM.AppServer.Client`
- `/workspace <working directory path>`: Specifies the working directory to put the files. If you do not enter anything here, the current directory is used.

Related topics

- ImxClient command line program on page 29
- ImxClient command overview on page 29

get-apistate

Queries the compilation status of the API in the database.

Parameters

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.
- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:
    - `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.
    - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.
    - `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.
- `/factory <target system>`: Specifies the target system for the connection. Enter this parameter if you want to establish a connection to the application server. Example: `QBM.AppServer.Client.ServiceClientFactory, QBM.AppServer.Client`
- `/branch <compilation branch ID>`: Queries the compilation status of the API saved under this compilation branch.
- `/htmlapp <name of the HTML package>`: Returns data for the specified HTML package.
- `-D`: Returns data for debug assemblies.
- `-R`: Returns data for release assemblies.

Related topics

get-filestate

Compares the local file structure with the file structure in the database.

Using the **QBM | ImxClient | get-filestate | NewFilesExcludePatterns** configuration parameter, you can define which files are excluded from the synchronization. This prevents excessive load during synchronization. The `node_modules` and `imx-modules` folders are excluded from the synchronization by default.
You can adjust the configuration parameters in the Designer. When specifying the rules, use the format defined in:
https://docs.microsoft.com/dotnet/api/microsoft.extensions.filesystemglobbing.matcher
Use the **|** character to delimit multiple entries.

NOTE: This configuration parameter is generally only used to exclude new files from the synchronization. Files that already exist in the database are not taken into account.

Parameters

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.
- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Required parameters:

- `/targets <target1;target2;...>`: Specifies which machine roles you want to use.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:
    - `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.
    - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.
    - `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.
- `/factory <target system>`: Specifies the target system for the connection. Enter this parameter if you want to establish a connection to the application server. Example: `QBM.AppServer.Client.ServiceClientFactory`, `QBM.AppServer.Client`
- `/workspace <directory path>`: Specifies the working directory where the files you want to match are located. If you do not enter anything here, the current directory is used.

Related topics

- ImxClient command line program on page 29
- ImxClient command overview on page 29

help

Displays a list of available commands.

Parameters

To view help for a specific command, add the command as a parameter.
Example: `help fetch-files`

Related topics

- ImxClient command line program on page 29
- ImxClient command overview on page 29

inject-package

Installs packages from a tgz file into the `node_modules` directory of the working directory.

This is intended to be used only with local, dependency-free packages that do not require a full NPM installation.

Parameter

Required parameters:

- `/inject <package1>,<package2>,...`: Specifies which packages to install. Enter the packages' names, separated by commas.

Optional parameter:

- `/workspace <working directory path>`: Specifies the working directory where the packages will be installed in the `node_modules` subdirectory. If you do not enter anything here, the current directory is used.

Related topics

- ImxClient command line program on page 29
- ImxClient command overview on page 29

install-apiserver

Installs an API Server on the local Internet Information Services (IIS).

Parameters

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.
- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Required parameters:

- `/app <application name>`: Specifies which name is used for the application (for example, in the browser's titlebar).
- `/sessioncert <certificate thumbprint>`: Specifies which (installed) certificate is used for creating and verifying session tokens.

  TIP: For example, to obtain a certificate thumbprint, you can use the **Manage computer certificates** Windows function and find the thumbprint through the certificate's detailed information.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:

    - `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.

    - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.

    - `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.

- `-u`: Allows insecure HTTP connections to the API Server website. By default, the API Server website can only be opened over an encrypted connection.

- `/site <site name>`: Specifies the website on the IIS under which the web application will be installed. If you do not enter anything, the website is found automatically (normally **Default website**).

- `/searchservice <URL>`: Specifies the application server's URL that the search service you want to use is hosted on.

    NOTE: If you would like to use the full text search, then you must specify an application server. You can enter the application server in the configuration file at a later date.

Related topics

push-files

Saves files that you have changed locally back to the database.

Parameters

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.

- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Required parameters:

- `/targets <target1;target2;...>`: Specifies which machine roles you want to use.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:

- `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.
  - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.
  - `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.
- `/factory <target system>`: Specifies the target system for the connection. Enter this parameter if you want to establish a connection to the application server. Example: `QBM.AppServer.Client.ServiceClientFactory`, `QBM.AppServer.Client`
- `/workspace <folder path>`: Specifies the working directory where the files are located that have been modified and are now to be stored in the database. If you do not enter anything here, the current directory is used.
- `/tag <uid>`: Specifies the change label to use to book the changes. For more information about change labels, see the *One Identity Manager Operational Guide*.
- `/add <file1;file2;...>`: Specifies which new database files are added. Use relative paths.
- `/del <file1;file2;...>`: Specifies which database files are deleted. Use relative paths.
- `-C`: Prevents the saving of changed files and saves only new files, and deletes files from the database.

Related topics

- ImxClient command line program on page 29
- ImxClient command overview on page 29

repl

Starts the ImxClient command line tool in REPL mode.

In this mode, the following actions are performed in an infinite loop:

- Read commands from **stdin**
- Forward commands to the relevant plug-in
- Output the results of processing to **stdout**

Related topics

- ImxClient command line program on page 29
- ImxClient command overview on page 29

run-apiserver

Starts or stops a local self-hosted API Server.

This command requires a database connection.

Parameters

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.
- `/dialog <dialog authentication>`: Specifies the dialog authentication.

Optional parameter:

- `/conndialog <option>`: Specifies whether a login window is displayed for the database connection. The following options are possible:
    - `off`: The login window is not shown. If the database is not connected, an attempt is made to establish a connection.
    - `show`: The login window is shown (even is a database is already connected) and the new connection replaces the old one.
    - `fallback` (default): The current database connection is used. If the database is not connected, an attempt is made to establish a connection.
- `/factory <target system>`: Specifies the target system for the connection. Enter this parameter if you want to establish a connection to the application server. Example: QBM.AppServer.Client.ServiceClientFactory, QBM.AppServer.Client
- `-S`: Stops the API Server.
- `/baseaddress <base URL with port>`: Specifies the base URL and port of the web application where the API Server accepts connections.

  > **Example**
  >
  > `/baseaddress http://localhost:8184`

- `/baseurl <root URL>`: Specifies the web application's URL.

  > **Example**
  >
  > `/baseaddress http://localhost`

- `/plugin <file name 1, file name 2>`: Loads additional plug-ins from the given files.

- `/htmldir <directory>`: Specifies the directory to use to load additional HTML application files and plug-in. This setting is intended for development scenarios.

> **Example**
>
> ```
> /htmldir C:example\imxweb\cpl
> ```
>
> The **cpl** plug-in is loaded from the `C:example\imxweb\cpl` folder instead of the default source.

- `-T`: Queries the status of the current API Server.
- `-B`: Locks the console.

Related topics

start-update

Checks if software updates are available. If software updates are found, the software update starts.

Parameter

Login parameter:

- `/conn <database connection>`: Specifies the database you want to connect to.

Optional parameter:

- `/target <update directory path>`: Specifies the installation directory of the software to update. If you do not enter anything here, the current directory is used.
- `-C`: Only checks if software updates are available. The software update does not start.
- `-G`: Hides the software update user interface.

Related topics

workspace-info

Queries the state of the Angular working directory (existing applications and last API client update).

Parameters

Optional parameter:

- `/workspace`: Specifies which working directory to query. If you do not enter anything here, the current directory is used.

Related topics

- ImxClient command line program on page 29
- ImxClient command overview on page 29

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