

# SYSPRO OData

SYSPRO 8

Reference Guide

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## SYSPRO OData

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# SYSPRO OData

## Exploring

### Where it fits in?

The **SYSPRO OData** feature lets you connect securely to SYSPRO data without direct SQL access and retrieve data for use by third-party applications. It is a future-proof technology that provides a RESTful API to the SYSPRO database and allows OData-compliant applications to query SYSPRO data in a standard and controlled manner.

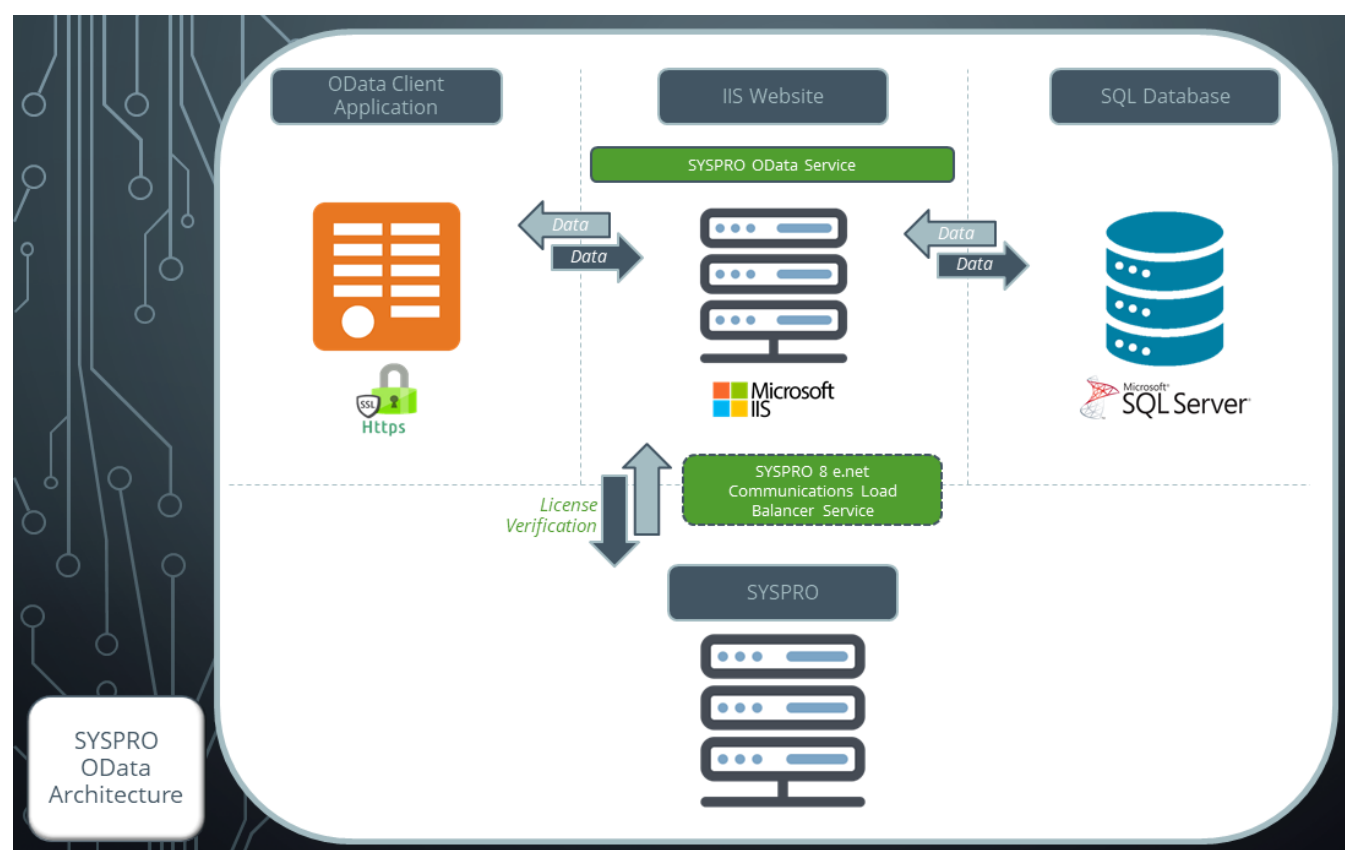
Although it is available for both on-premise and cloud solutions, **SYSPRO OData** is the only mechanism available when applications need access to SYSPRO data in the **SYSPRO Cloud ERP** environment (the **SYSPRO Cloud ERP** platform doesn't allow direct database access by any application or personnel).

### Benefits

Systems Integrators, Independent Software Vendors and SYSPRO Customers can benefit from this solution in various ways:

- Perform easier and faster integrations between other systems and SYSPRO data using the HTTP protocol stack
- Access and interact with SYSPRO company and system-wide databases in a consistent manner using RESTful web services
- Access a simple and uniform way to share data in a discoverable manner
- Extend SYSPRO's use for third-party data analysis tools (e.g. **Excel**, **PowerBI**, **Tableau** and other external analytical solutions)
- Simplify the data access mechanism
- Lower the risk of inappropriate data access
- Prevent the requirement for direct SQL Access in future

## Architecture Overview



As indicated on the diagram, there are four main components to consider:

### OData Client Applications

- Client applications that are OData-compliant can consume the OData feed exposed by the **SYSPRO OData Service** and gain access by providing the basic authentication details over HTTPS.
- The functionality available from the **SYSPRO OData Service** depends on the client application's capabilities.
- The client application is then used to process and present data in a meaningful way.

### IIS Website and SYSPRO OData Service

- The **SYSPRO OData Service** is hosted by Internet Information Services (IIS).
- A secure HTTPS connection must exist between the **SYSPRO OData Service** and the OData Client application.
- **SYSPRO OData** interacts with SYSPRO and the SYSPRO databases to expose the SYSPRO OData entities (and the data contained within these entities) using OData 4.0 standards.

- Basic authentication over HTTPS is used to authenticate OData operators of the **SYSPRO OData Service**.
- REST calls received from the OData Client applications are serviced by **SYSPRO OData** according to OData 4.0 standards.

## Microsoft SQL Server

- This is the SQL Server responsible for hosting the SYSPRO databases and equates to the data store for **SYSPRO OData**.
- For the **SYSPRO OData Service** to gain access, SQL users must be configured within **Microsoft SQL Server** with read-only access to the relevant tables.



Currently, OData operators only require *READ* access to the SYSPRO databases and relevant tables.

## SYSPRO

- SYSPRO provides all the required functionality for **SYSPRO OData** to establish safe connections to the SYSPRO databases and perform the required license check for the OData functionality.
- SYSPRO allows **SYSPRO OData** access to all the required SYSPRO information for serving correct SYSPRO OData entities, entity relationships and entity properties (i.e. fields).

## SYSPRO OData Security Operators

The **SYSPRO OData** feature provides SYSPRO administrators with a mechanism for flagging a SYSPRO operator as an OData operator. The system then generates a set of credentials that can be used in the OData environment which can then be sent via email to a third-party user to authenticate to the OData layer and SQL databases.

All controlled access to the SYSPRO database then occurs by means of the configured SYSPRO operator code which has been given read-only access to specific companies and/or tables.

## Data Connector - OData Licensing

There are two types of **Data Connector - OData** licensing:

- Site license
- Managed Run Time Product license

### OData Site license

The simplest OData license mechanism will be at the site level.

A SYSPRO site (on-premise or using **SYSPRO Cloud ERP**) can request an OData site license. Once the license has been issued and implemented at the site, any applications or solutions (such as analysis tools or subscriber feeds) can use the **SYSPRO OData Service** to access the SYSPRO databases at that site.



SQL login permissions are used to allow or deny data access, typically at the table level.

### OData Run Time Product license

Run Time Products are applicable where an ISV has a commercial arrangement with SYSPRO. Once agreed, a Run Time Product is added to the list of available Run Time Products that can be included in the SYSPRO license.

If a customer elects to include the Run Time Product, then the license is issued with the Run Time Product included. Once imported at the site, the Run Time Product can then pass the product code at the time of logging into **e.net Solutions**. The login process validates the product code against the SYSPRO license and grants access to the applicable functional areas (i.e. Standard or Managed).

In addition, if it has been agreed that the Run Time Product can access the **SYSPRO OData Service**, then the Run Time Product passes the product code as part of the call. This causes the **SYSPRO OData Service** to validate the OData Run Time Product license - providing access when relevant.

With a Managed Run Time Product license for **SYSPRO OData**, ISV's can connect their applications to SYSPRO for read-only data access, regardless of whether the customer has an OData Site license.

Considerations:

- Each time the ISV product calls the **SYSPRO OData Service**, the Run Time Product code is passed (alongside any additional authentication) so that the service can enable the data access to proceed.
- The OData Run Time Product requires a **Managed** license type. Run Time Products created prior to **SYSPRO 8 2021 R1** that require OData access must be changed to be **Managed** licenses and require a list of e.net Functional Areas.

# Terminology

## Connected Services

SYSPRO's Connected Services consist of multiple capabilities that provide integration touch points between SYSPRO and external parties.

Existing Connected Services include:

- e.net Solutions
- SYSPRO Ken the BOT (available from **SYSPRO 8 2018 R2**)
- SYSPRO Supply Chain Portal (available from **SYSPRO 8 2019 R2**)
- Tax Connector - Avalara (available from **SYSPRO 8 2021 R1**)
- Tax Connector - Vertex (available from **SYSPRO 8 2021 R1**)
- Data Connector - OData (available from **SYSPRO 8 2021 R2**)

## OData

OData (i.e Open Data Protocol) is an ISO/IEC approved, OASIS standard that defines a set of best practices for building and consuming RESTful APIs. It's a REST-based protocol for querying and updating data. It is built on standardized technologies such as HTTP, Atom/XML, and JSON and is different from other REST-based web services in that it provides a uniform way to describe both the data and the data model.

OData helps you focus on your business logic while building RESTful APIs without having to worry about the various approaches to define request and response headers, status codes, HTTP methods, URL conventions, media types, payload formats, query options, etc.

It also provides guidance for tracking changes, defining functions/actions for reusable procedures and sending asynchronous/batch requests.

The OData metadata (a machine-readable description of the data model of the APIs) enables the creation of powerful generic client proxies and tools.

OData is considered to be a flexible technology for enabling interoperability between disparate data sources, applications, services and clients.



Visit <https://www.odata.org> for more information.

## Run Time Product

SYSPRO has commercial arrangements with several Independent Software Vendors (ISVs).

The products that ISVs develop require integration into SYSPRO, often using **e.net Solutions** to call e.net business objects. However, a requirement may exist for direct database access. Run Time Product licenses are issued for this purpose.

This allows a third-party product to connect seamlessly to e.net Solutions at a SYSPRO site that selects to license the Run Time Product without any further e.net licensing implications.

While the **Run Time Product** license doesn't require any additional configuration or assignment of licenses at the site, the SYSPRO site must have licensed the underlying required module.

### FOR EXAMPLE:

If the Run Time Product accesses the Accounts Receivable Query Functional Area, then the SYSPRO site must have also licensed the **Accounts Receivable** module (which would inevitably be the case otherwise there wouldn't be any Accounts Receivable data).

Run Time Products were typically allowed open access to any e.net functional area. From **SYSPRO 8 2021 R1** onwards, however, it's possible to have two types of Run Time Products access:

- **Standard**

This means that all functional areas are accessible and equates to the same as the traditional licenses issued).

- **Managed**

This means that a limited number of functional areas are accessible by the Run Time Products.

In this case, the Run Time Products definition file lists the e.net functional areas required and the license generated and applied at the SYSPRO site ensures that only these functional areas are licensed.



You can check the type of access for your Run Time Product, by viewing the **Run Time Products** pane of the **Company Maintenance** program (indicated in the **Access** column).



# Starting

## Prerequisites Technology

The following technology prerequisites are applicable:

- Microsoft .NET Framework 4.6
- Internet Information Services (IIS) - including:
  - .NET Core hosting bundle (version 3.1.12 or higher)



Minimum .NET Core frameworks required by the SYSPRO OData API:

- Microsoft.AspNetCore.App (version 3.1.8 or higher)
- Microsoft.NETCore.App (version 3.1.0 or higher)
- NETStandardLibrary (version 2.1.0 or higher)

- SSL Certificate for live production sites



The **SYSPRO OData** deployment must be secured by an IIS certificate.

An SSL certificate can be purchased online and deployed on the host server. It is essentially the remit of the solution platform provider to assist in deploying a valid SSL certificate into the IIS instance and to configure the solution for access on **Port 443**.

- A connection to Microsoft SQL Server
- A connection to the SYSPRO 8 e.net Communications Load Balancer via net.tcp
- SYSPRO OData Service



We strongly recommend exposing this service over HTTPS to ensure security.

## Licensing

To use this feature, the following module(s) must be installed according to the terms of your software license agreement:

- e.net System Manager
- Data Connector - OData

## Configuring Setup Options

*Setup Options > System Setup > Connectivity*

You need to configure the following setup options:

### ODATA

This lets you connect to the **SYSPRO OData Service** (i.e. the OData layer).

- OData endpoint

#### FOR EXAMPLE:

```
https://localhost/SYSPRO8Odata/SYSPROOData
```

### EMAIL/SMTP SETTINGS

This is required if you select to use the **Send email** function of the **Operator Maintenance** program.

- SMTP server IP address
- Outgoing email address
- Username
- Password
- Server port
- Use SSL

## Operator Maintenance

*SYSPRO Ribbon bar > Setup > Operators*

The **OData user** option must be enabled against the SYSPRO operators that require SYSPRO OData access.

To use the **SYSPRO OData** solution, the required SQL users must also be created within **Microsoft SQL Server** and configured with `READ` access to the relevant SQL tables and databases.

Therefore, from **SYSPRO 8 2021 R2**, the **Generate Credentials** function of the **Operator Maintenance** program does this for you automatically. An associated OData SQL user is generated with `READ-ONLY` permissions and the new credentials are then populated automatically within the **OData user name** and **OData SQL login name** fields.



We don't recommend using an `ADMIN` user or users with `WRITE` access to the SQL data if you create SQL users manually,

## Restrictions and Limits

- OData URL conventions:

Not all OData URL conventions are supported. In particular, complex multi-level URLs (i.e. multiple entities).

Although there are limitations in terms of the URL conventions, you are not limited in terms of data retrieval and required data can still be queried by using the supported URL conventions.

**FOR EXAMPLE:**

The `$filter` clause is required to select a specific record or subset of records.



Refer to the **SYSPRO OData Query Options** section for information regarding supported URL conventions.

- Records:

**SYSPRO OData** is a light data gathering solution. Therefore, we limit to 5000 rows under the **Microsoft** best practice guidelines for performance and fair use.



Refer to the **What if I need to call more than 5000 rows?** FAQ for information about how to overcome this limitation.

# Solving

## FAQs

### SYSPRO OData URLs

#### What makes up the SYSPRO OData URL?

The URL used to query data within SYSPRO comprises the base URL for the OData website, followed by separate entities that change depending on the information you are querying (e.g. company ID, table name, query parameters, etc.).

##### FOR EXAMPLE:

```
https://localhost/SYSPRO80data/SYSPRO0Data/edu1/ArCustomer
```

where:

- `https://localhost/SYSPRO80data/SYSPRO0Data` indicates the static base URL.
- `/edu1/ArCustomer` indicates the dynamic entities added to the endpoint.
  - `edu1` indicates the company being queried.
  - `ArCustomer` indicates the table within that company.

#### How does the URL convention differ between on-premise sites and SYSPRO Cloud ERP sites?

The only difference between on-premise and SYSPRO Cloud ERP sites connecting to **SYSPRO OData** is the base URL for the OData Website.

##### FOR EXAMPLE:

- On premise:

```
https://localhost/SYSPRO80data/SYSPRO0Data/edu1/ArCustomer
```

- SYSPRO Cloud ERP:

```
https://pmotst01.sysprocloud.com/SYSPRO80Data/SYSPRO0data/edu1
```

#### What URL convention do I use to query data in a company database?

The format of the call to query company data is:

`https:// ServiceBaseURL /SYSPRO0Data/ SYSPRO Company / SYSPRO Table ? Query parameters`

##### FOR EXAMPLE:

```
https://localhost/SYSPRO80data/SYSPRO0Data/edu1/ArCustomer?select=Customer,Name
```

## What URL convention do I use to query data in the system database?

The format of the call to query system data is:

`https:// ServiceBaseURL /SYSPROOData/ system / SYSPRO Table ? Query parameters`

### FOR EXAMPLE:

```
https://localhost/SYSPRO80data/SYSPROOData/system/AdmOperator?$Select=Operator,
Name, GroupCode&$Top=2
```

## Functionality

### Who would benefit from using SYSPRO OData?

The **SYSPRO OData** solution provides a standard way of connecting and integrating with other applications and is therefore applicable to anyone who wants to retrieve data from the SYSPRO databases using one of the following methods:

- Excel, PowerBI, Tableau and other external analytical solutions.
- PHP where a REST-friendly address is required, as well as the ability to query data and insert select statements in a browser (e.g. HTTP requests).
- Developers working in Visual Studio who need to query SYSPRO data.

### How can an ISV access SYSPRO OData without the customer having a site license?

ISV's can access **SYSPRO OData** (without the customer having to license it for their SYSPRO site) by passing their runtime product code when calling the **SYSPRO OData Service**.

To pass a runtime product code with a call to the **SYSPRO OData Service**, the words `#RunTimeProductCode#` and the actual product code must be included as part of the username of the basic authentication information for all API requests.

The structure of the username field should be as follows:

```
[username]#RunTimeProductCode#[runtime product code]
```

### FOR EXAMPLE:

- Runtime product code: OData123
- Username: Blogs

Based on this example, the username field for the basic authentication must be specified as:

```
Blogs#RunTimeProductCode#OData123
```

If no runtime product code is provided and the site isn't licensed for the **Data Connector - OData** module, then the **SYSPRO OData** functionality will not be available for use.

## How do I refresh the data structure after making configuration changes in SYSPRO?

You would use the **GetVersion** call.

### FOR EXAMPLE:

```
https://localhost/SYSPRO80Data/GetVersion
```

The **GetVersion** call not only returns the version of the **SYSPRO OData Service**; it also refreshes the company data structure to ensure that any database configuration changes made within SYSPRO are refreshed and used by the service.

## Does SYSPRO OData support paging?

**SYSPRO OData** supports paging as the `$top` and `$skip` clauses are built-in as standard.



All calls are `GET` type calls, as **SYSPRO OData** only supports reading data.

## Does SYSPRO OData have rate limits?

Currently, **SYSPRO OData** doesn't have rate limitations (e.g. rows per minute or per second limiting). However, to assist with faster calls and returns, developers and ISV's need to be mindful of how much data they are consuming, taking care to use query parameters to limit the amount of data being returned.

## How can I view all table entities available within SYSPRO?

Developers may find it useful to have a complete list of all entities that are available within the SYSPRO databases, as this can assist in the way they construct their client code to interact with the SYSPRO entities.

1. Open you browser.
2. Enter your URL and the `$metadata` clause.

### FOR EXAMPLE:

```
https://localhost/SYSPRO80Data/SYSPRO0Data/edu1/$metadata
```

This returns an XML format listing of each table as an entity (i.e. table name in the database), properties (i.e. column names) and navigation properties.



To override the set limits of data returned, specify the normal OData URL conventions using OData structure and query language.

## What if I need to call more than 5000 rows?

There are various ways to overcome the 5000 row limit:

- You can limit the calls to weeks, periods, months or years and then combine multiple calls into one dataset within your BI tool.
- You can use an ETL tool to refresh the data into a Data Lake or Repository and then run the BI tool on the dataset created from a feed within the **SYSPRO OData** solution.
- The **SYSPRO Business Activity Queries** feature (available from **SYSPRO 8 2021 R2**) lets you create Views on the Database for OData consumption, thereby providing aggregation and summary custom datasets. These can then be used within Insight Tiles, reports, etc.

## Why can't I see custom form tables in the data table listing?

Custom form tables don't appear in the listing of tables as you would expect to see them in **Microsoft SQL Server** (i.e. SQL tables ending with a plus). Instead, they are now suffixed with `_company`.

### FOR EXAMPLE:

Microsoft SQL Server: `ApSupplier+`

OData: `ApSupplier_edu1`

## Deployment

### Do I need an OData connector license per company or per installation?

A single OData instance serves multiple companies. Once an OData site license has been issued and implemented, any OData enabled applications or solutions can use the **SYSPRO OData Service** to access the SYSPRO SQL databases and data at that site.

### Who deploys and manages the SYSPRO OData Service?

The **SYSPRO OData** solution can be deployed on-premise or within the SYSPRO Cloud offering:

- On-Premise (or MCS Cloud):  
The SYSPRO Region/Partner Tech Consultant or Customer
- Cloud:  
The SYSPRO Cloud support teams. Specifically, by change request to managed services or via the cloud portal.

### What skills are required for deploying the SYSPRO OData Service?

For on-premise deployments, the deployment team should have the following skills:

- Windows Service Deployment (to install and configure the solution)
- SQL Instance Management (to configure users and manage permissions)
- OData awareness (to output data)
- SYSPRO OData best practice awareness (to optimize performance)
- IIS SSL Certification Application (for security)

### Why do I need to apply an SSL certificate?



The **SYSPRO OData** deployment must be secured by an IIS certificate.

An SSL certificate can be purchased online and deployed on the host server. It is essentially the remit of the solution platform provider to assist in deploying a valid SSL certificate into the IIS instance and to configure the solution for access on **Port 443**.

The core function of an SSL certificate is to protect server-client communication. It protects your information online by encrypting any data sent to you, and then decrypting it once you've received it (i.e. the data is locked and can only be unlocked by the intended recipient as no-one else can have the key to open it).

SSL certificates also provide website authentication - identity verification being one of the most important aspects of web security.



## How do I apply an SSL certificate to my IIS website?

### Requirements:

- Your server certificate
- Your intermediate certificates
- Your private key

### Installation instructions:

1. Launch the **Internet Information Services (IIS) Manager**.
2. Select your server name from the **Connections** menu (i.e. the host to which you want to install the certificate).
3. Navigate to the **Security** section by selecting the **Server Certificates** icon under **Security**.
4. Select the **Complete Certificate Request** function from the **Actions** menu.
5. From the **Complete Certificate Request** wizard, browse for your Server Certificate file (previously saved on your server's desktop) and select **OK**.

### Binding your certificate to your website:

The following describes how to assign or bind the SSL certificate to the appropriate website:

1. From the **Connections** menu in **Internet Information Services (IIS) Manager**, expand your server's name, followed by the **Sites** folder, and then select the site that you want to secure.
2. Select the **Bindings** function of the **Actions** menu.
3. From the **Site Bindings** window, select the **Add** function.

If you already have the appropriate site binding created, select the **Edit** function to change the SSL Certificate accordingly.

4. Enter the following within the **Add Site Binding** window:
  - **Type:** https
  - **IP Address:** All unassigned.  
If you have multiple IP addresses, select the correct one that applies.
  - **Port:** 443
  - **SSL Certificate:** Select the *friendly name* of the SSL certificate you've installed.  
You can also select the **View** function to confirm the validity of the certificate.
5. Select **OK** to finish binding the SSL certificate to your live website.

As SSL certificates have an expiry date, ensure that you renew your certificates timeously to prevent any unexpected down time.

## Alternative options for accessing SYSPRO data

### Can I still make use of the e.net business object layer?

The e.net business object layer is still the preferred mechanism of applications accessing any business logic, including data queries, as well as add, update, delete and transactional access.

The **Data Connector - OData** module is designed for cases where the e.net business object layer is unable to provide the data access required for the business solution.

### Why shouldn't I use applications that make use of direct database access to the SYSPRO data?

The **SYSPRO OData** feature is a significant improvement over applications that use direct database access to the SYSPRO data.

This is because that type of direct database access doesn't provide traceability or visibility about what access is being performed, regardless of whether the access has the correct permissions and how frequently access is being made.

This lack of visibility and traceability leads to a high-risk site.

## Upgrading from on-premise to cloud

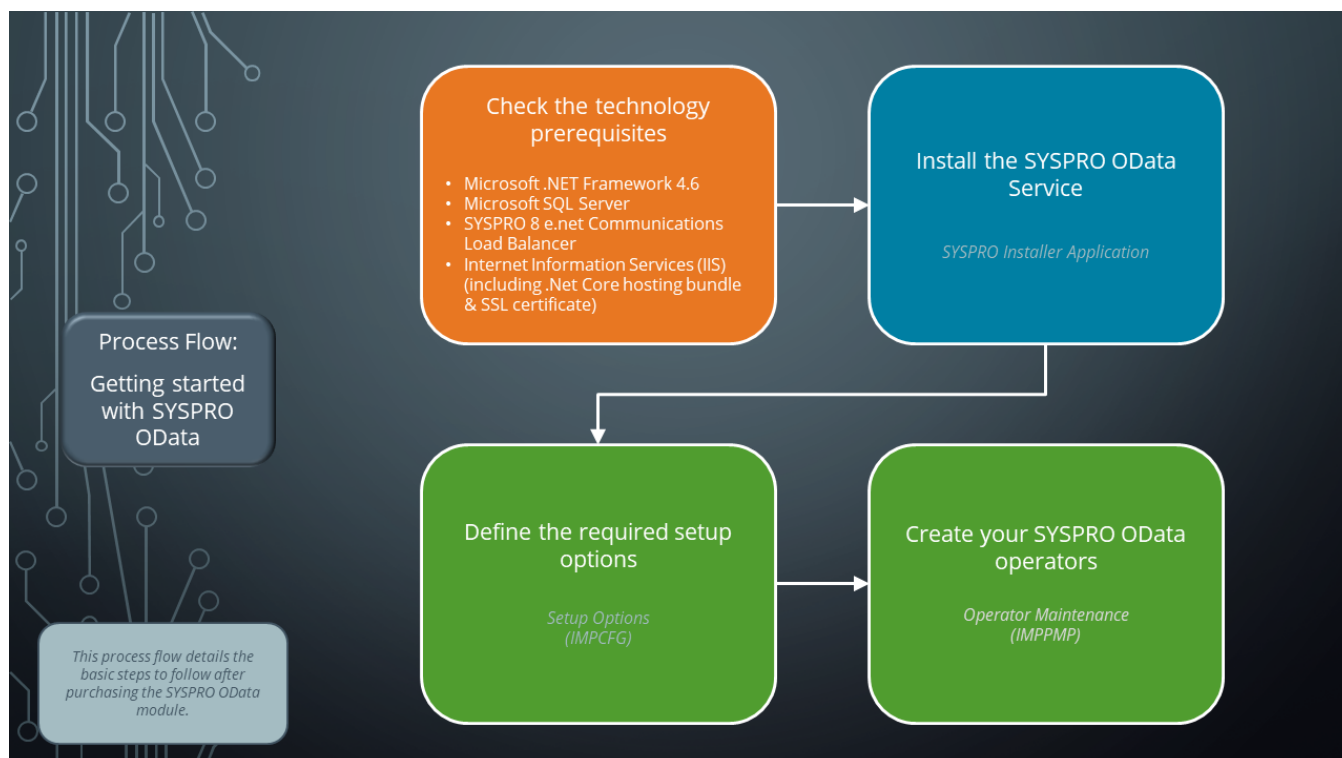
### What if a customer upgrades from on-premise to SYSPRO Cloud ERP?

As direct SQL access is restricted in the **SYSPRO Cloud ERP** environment, sites that upgrade from SYSPRO on-premise to a SYSPRO Cloud deployment are required to re-skill in OData and update any linked solutions using OData (rather than ODBC access to the SQL database).

# Using

## Process

### Getting started with SYSPRO OData



The following outlines the steps you need to follow after purchasing the **Data Connector - OData** module:

1. Ensure that the following technology prerequisites have been installed:

- Microsoft .NET Framework 4.6
- Internet Information Services (IIS) - including:
  - .NET Core hosting bundle (version 3.1.12 or higher)



Minimum .NET Core frameworks required by the SYSPRO OData API:

- Microsoft.AspNetCore.App (version 3.1.8 or higher)
  - Microsoft.NETCore.App (version 3.1.0 or higher)
  - NETStandardLibrary (version 2.1.0 or higher)
- SSL Certificate for live production sites

- □  The **SYSPRO OData** deployment must be secured by an IIS certificate.

An SSL certificate can be purchased online and deployed on the host server. It is essentially the remit of the solution platform provider to assist in deploying a valid SSL certificate into the IIS instance and to configure the solution for access on **Port 443**.

- A connection to Microsoft SQL Server
- A connection to the SYSPRO 8 e.net Communications Load Balancer via net.tcp

2. Install the **SYSPRO OData Service** using the **SYSPRO Installer Application**.



We strongly recommend exposing this service over HTTPS to ensure security.

3. Define the required setup options:

- a. Open the **Setup Options** program and navigate to the **Connectivity System Setup** form (*Setup Options > System Setup > Connectivity*).
- b. Indicate the base portion of the SYSPRO OData URL and your particular endpoint at the **ODATA ENDPOINT** field.

This lets operators who are configured as OData users to access data within the SYSPRO databases using the **SYSPRO OData Service**.

**FOR EXAMPLE:**

```
https://localhost/SYSPRO8odata/SYSPROOData/edu1
```

- c. Ensure that your **EMAIL/SMTP SETTINGS** are configured correctly.

This lets you use the **Send email** function of the **Operator Maintenance** program to email an operator their OData credentials.

- SMTP server IP address
- Outgoing email address
- Username
- Password
- Server port
- Use SSL

4. Create your SYSPRO OData operators:

To use the **SYSPRO OData** solution, the required SQL users must be created within **Microsoft SQL Server** and configured with `READ` access to the relevant SQL tables and databases.

You can achieve this within SYSPRO from **SYSPRO 8 2021 R2** as follows:

- a. Open the **Operator Maintenance** program (*SYSPRO Ribbon bar > Setup > Operators*).
- b. Indicate the operator code you want to use for OData or create a new operator and enter the applicable **Operator Details**.
- c. Navigate to the **Options** tab of the **Options** pane:

- i. Enable the **OData user** option.
- ii. Select the **Generate credentials** function.

The system prompts you to first save your changes before generating an associated OData SQL user and password with `READ-ONLY` permissions.

The new credentials are then populated automatically within the **OData user name** and **OData SQL login name** fields.



This information is stored within the `AdmOperatorPwd` table.

- iii. *Optional*

Use the **Configure OData email template** function to define the template used when emailing OData credentials to the operator.



Once configured, this template is stored in the `\Base\Samples` folder with the file name `EML_ODASVC_EN.TXT`.

- iv. Select the **Send Email** function to email these credentials confidentially (using SMTP) to the email address defined against the operator, including a password reset and resend function in SYSPRO.
- d. Save your changes.

## Connecting a third party application to SYSPRO OData

The following uses **Microsoft Excel** as an example of a third party application connecting to the SYSPRO data:

1. Launch the third-party application - in this case **Microsoft Excel**.
2. Select the **Data** tab and expand the **Get Data** menu, followed by **From Other Sources**.  
Select the **From OData Feed** option.



In other third party applications, you would typically select the **Choose OData Feed** option from **Available data sources** (or similar wording).

3. Select **Basic** on the **OData feed** window and enter your endpoint (i.e. URL) for the applicable entity (i.e. company id or system) that you want to query.

### URL example:

```
https://localhost/SYSPRO8Odata/SYSPROOData/edu1
```

4. Select OK.

The **OData feed** window is displayed.

5. From the **Basic** tab, enter the user name and password applicable for your configured SYSPRO OData operator.
6. Select the **Connect** function.

The endpoint is queried and the **Navigator** window returns all available tables for the SQL database being queried.

7. Select the tables that you want to pull into **Microsoft Excel** (i.e. your SQL based third party application).



The initial load of OData can take a few minutes in some instances, however subsequent calls are significantly faster as the system uses preloaded libraries, cached metadata, etc.

## Metadata

The **SYSPRO OData Service** exposes the metadata available that can be used by third party applications to understand the data, and the relationship between the data. Therefore, you can query the metadata for the service by utilizing the `$metadata` call (e.g.

`SYSPRO80Data/SYSPROOData/edu1/A/$metadata`).



This applies for both standard database tables and custom form field tables as the `$metadata` call provides all the entity information, including the custom form entities.

This call (as per the OData standard) returns the EDMX (i.e. XML document) that contains a complete description of types, relationships and properties exposed by the service.

### FOR EXAMPLE:

SYSPRO database structure:

- `https://localhost/SYSPRO80Data/SYSPROOData/edu1/$metadata`

SYSPRO InvPrice table structure example:

- `https://localhost/SYSPRO80Data/SYSPROOData/edu1/$metadata#InvPrice`

Sample output:

```
<?xml version="1.0" encoding="utf-8"?>
<edmx:Edmx Version="4.0" xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx">
  <edmx:DataServices>
    <Schema Namespace="SYSPRODBModel" xmlns="http://docs.oasis-open.org/odata/ns/edm">
      <EntityType Name="AbcAnalysis">
        <Key>
          <PropertyRef Name="Element" />
          <PropertyRef Name="EntryNumber" />
          <PropertyRef Name="Incident" />
          <PropertyRef Name="InvRegJournal" />
          <PropertyRef Name="TrnDate" />
        </Key>
        <Property Name="Element" Type="Edm.String" Nullable="false" />
        <Property Name="Incident" Type="Edm.String" Nullable="false" />
        <Property Name="TrnDate" Type="Edm.DateTimeOffset" Nullable="false" />
        <Property Name="InvRegJournal" Type="Edm.Decimal" Nullable="false" />
        <Property Name="EntryNumber" Type="Edm.Decimal" Nullable="false" />
        <Property Name="StockCode" Type="Edm.String" />
        <Property Name="GIPeriod" Type="Edm.Decimal" Nullable="false" />
      </EntityType>
    </Schema>
  </DataServices>
</edmx:Edmx>
```

...

## SYSPRO OData Query Options (supported URL conventions)

The **SYSPRO OData Service** exposes read-only data as entities that have a direct mapping to the SYSPRO database tables.

### FOR EXAMPLE:

- `https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer` returns data for the `ArCustomer` table from SYSPRO company EDU1.
- `https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer/$top=600` returns the top 600 rows of data for the `ArCustomer` table from SYSPRO company EDU1

Therefore, the **SYSPRO OData Service** supports the following OData query options on the SYSPRO entities:

- `$filter`  
e.g. `https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer?$filter=Name eq 'Spider Man ind'`
- `$count`  
e.g. `https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer?count=true`
- `$orderby`  
e.g.  
`https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer?orderby=ShortName, Name`
- `$skip`  
e.g. `https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer?skip=10`
- `$top`  
e.g. `https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer?top=10`
- `$expand` (only 1st-level expansion is supported)  
e.g.  
`https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer?expand=ArCustomer_2`
- `$select`  
e.g.  
`https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer?select=Customer, Name`



Paging is supported via the `$skip` / `$top` clauses.



## Sample Calls

The following provides some examples of calls that are allowed by the **SYSPRO OData Service**:

### SYSPRO System Database

Using the **System** entity enables you to call into the SYSPRO System database (e.g. [Sysprodb](#)).



The format of the call to query the System database is:

**ServiceBaseURL /SYSPROOData/ system / SYSPRO Table ? Query parameters**

### Query AdmOperator table

In this scenario:

- Select top 2 operators
- Return only their Operator codes, Names and Group codes

#### SAMPLE CALL:

```
https://localhost/SYSPRO80Data/SYSPROOData/system/AdmOperator?$Select=Operator, Name, GroupCode&$Top=2
```

#### SAMPLE OUTPUT:

```
{
  "@odata.context": "http://localhost/SYSPRO80Data/SYSPROODATA/system/$metadata#AdmOperator(Operator,Name,GroupCode)",
  "value": [
    {
      "Operator": "ADMIN",
      "Name": "SYSPRO Administrator",
      "GroupCode": "ADMIN"
    },
    {
      "Operator": "ALAN ",
      "Name": "ALAN BROWN2",
      "GroupCode": "OPS"
    }
  ]
}
```

## Query SysproAdmin table

In this scenario:

- Select everything from the [SysproAdmin](#) table

### SAMPLE CALL:

```
https://localhost/SYSPRO80Data/SYSPRO00Data/system/SysproAdmin
```

### SAMPLE OUTPUT:

```
{
  "@odata.context": "http://localhost/SYSPRO80Data/SYSPRO00DATA/system/$metadata#SysproAdmin",
  "value": [
    {
      "Company": "EDU1",
      "DatabaseName": "DS001_CMP_EDU1_800 ",
      "CollationName": "Latin1_General_BIN"
    },
    {
      "Company": "R ",
      "DatabaseName": "SysproCompanyR",
      "CollationName": "Latin1_General_BIN"
    }
  ]
}
```

## SYSPRO Company Tables



The format of the call to query data is:

**ServiceBaseURL /SYSPROOData/ SYSPRO Company / SYSPRO Table ?  
Query parameters**

In these examples, we are querying the [InvMaster](#) table for the `EDU1` company.

Retrieve all rows

### SAMPLE CALL:

```
https://localhost/SYSPRO80Data/SYSPROOData/edu1/InvMaster
```

### SAMPLE OUTPUT:

This will return all the rows of the [InvMaster](#) table.

Retrieve single stock code

### SAMPLE CALL:

```
https://localhost/SYSPRO80Data/SYSPROOData/edu1/InvMaster?$filter=StockCode eq 'A100'
```

### SAMPLE OUTPUT:

```
{
  "@odata.context": "http://localhost/SYSPRO80Data/SYSPROODATA/edu1/$metadata#INVMaster",
  "value": [
    {
      "StockCode": "A100",
      "Description": "15 Speed Mountain Bike Boys",
      "LongDesc": "Distribution",
      "AlternateKey1": " ",
      "AlternateKey2": " ",
      "EccUser": " ",
      "StockUom": "EA",
      "AlternateUom": "EA",
      "OtherUom": "EA",
      "ConvFactAltUom": 1.000000,
      "ConvMulDiv": "M",
      "ConvFactOthUom": 1.000000,
      "MulDiv": "M",
      "Mass": 10.000000,
      "Volume": 0.300000,
      ...
    }
  ]
}
```

## Retrieve stock levels

In this example, we are joining the [InvWarehouse](#) to the [InvMaster](#) table in our call to get stock levels. To perform any expands (i.e. joins), you must include the key of the primary table in your call. Therefore, to expand [InvWarehouse](#) in [InvMaster](#), you have to select `StockCode` from the [InvMaster](#) as part of the call.

In this scenario:

- Select `StockCode` and `Description` from `InvMaster`
- Join to `InvWarehouse` (SYSPRO handles the key joins)
- Return `Warehouse` and `QtyOnHand` from the `InvWarehouse` record

### SAMPLE CALL:

#### All Stock Codes

```
https://localhost/SYSPRO80Data/SYSPRO0Data/edu1/InvMaster?$Select=StockCode,
Description&$Expand=InvWarehouse($Select=Warehouse, QtyOnHand)
```

#### Single Stock Code

```
https://localhost/SYSPRO80Data/SYSPRO0Data/edu1/InvMaster?$Select=StockCode,
Description&$Expand=InvWarehouse($Select=Warehouse,
QtyOnHand)&$Filter=StockCode eq 'A100'
```

### SAMPLE OUTPUT:

```
{
  "@odata.context": "http://localhost/SYSPRO80Data/SYSPRO0DATA/EDU1/$metadata#INVMaster
(StockCode,Description,INVWarehouse(Warehouse,QtyOnHand))",
  "value": [
    {
      "StockCode": "A100",
      "Description": "15 Speed Mountain Bike Boys",
      "INVWarehouse": [
        {
          "Warehouse": "E",
          "QtyOnHand": 962.000000
        },
        {
          "Warehouse": "FG",
          "QtyOnHand": 0.000000
        },
        {
          "Warehouse": "N",
          "QtyOnHand": 910.000000
        },
        {
          "Warehouse": "S",
          "QtyOnHand": 435.000000
        }
      ]
    }
  ]
}
```

## Get Version

The **GetVersion** call returns the version of the **SYSPRO OData Service** and triggers a “refresh” of the company data structure. This ensures that any database configuration changes made within SYSPRO are refreshed and utilized by the service.

**SAMPLE CALL:**

```
https://localhost/SYSPRO80Data/GetVersion
```

**SAMPLE OUTPUT:**

```
SYSPRO OData Version: 8.0.0.0  
Copyright © 1994-2021 SYSPRO Ltd.
```

## Custom Form Tables

The **SYSPRO OData Service** allows for queries on custom form tables (i.e. SQL tables ending with a plus) within the company databases. Therefore, the service checks for these upon startup and performs the required build of the custom form tables to provide for the OData URL queries.

Custom form tables are referenced with the table name followed by an underscore and company id.

**FOR EXAMPLE:**

The [ArCustomer+](#) table within the `Edu1` company database will be referenced as [ArCustomer\\_edu1](#) in the OData URL.



Custom form tables that don't follow the standard custom form field conventions are excluded and therefore not provided for.

## Query a custom form table

In this scenario:

- Query the `ArCustomer+` custom form table within the `EDU1` company database

### SAMPLE CALL:

```
https://localhost/SYSPRO80Data/SYSPRO0Data/edu1/ArCustomer_edu1
```

### SAMPLE OUTPUT:

```
“value”: [  
  {  
    “Customer”: “0000000000000001”,  
    “NrOfEmployee”: 5145,  
    “Color”: “Red”  
  },  
  {  
    “Customer”: “0000000000000002”,  
    “NrOfEmployee”: 0,  
    “Color”: “ ”  
  },  
  {  
    “Customer”: “0000000000000003”,  
    “NrOfEmployee”: 10,  
    “Color”: “Blue”  
  },  
  {  
    “Customer”: “0000000000000005”,  
    “NrOfEmployee”: 200,  
    “Color”: “Silver”  
  },  
]
```

## Joining a custom form table (\$expand)

In this scenario:

- Query the ArCustomer+ custom form table within the EDU1 company database
- Expand on color and name

### SAMPLE CALL:

```
https://localhost/SYSPRO80Data/SYSPROOData/edu1/ArCustomer?$expand=ArCustomer_
edu1($select=Color)&$select=Name
```

### SAMPLE OUTPUT:

```
{
  "value": [
    {
      "Name": "Spider Man Ind",
      "ArCustomer_2": {
        "Color": "Red"
      }
    },
    {
      "Name": "Bikes & Blades - North",
      "ArCustomer_2": {
        "Color": ""
      }
    },
    {
      "Name": "Bikes & Blades - South",
      "ArCustomer_2": {
        "Color": "Blue"
      }
    },
    {
      "Name": "Cash Sales",
      "ArCustomer_2": {
        "Color": "Silver"
      }
    },
    {
      "Name": "Country Gardens - South",
      "ArCustomer_2": {
        "Color": null
      }
    }
  ]
}
```

## OData Cheat Sheet for SQL Users

OData protocol provides powerful features for querying data via URLs, very similar to **Microsoft SQL Server**. Therefore, the following cheat sheet can assist regular SQL users in understanding how to query data via OData, and how the OData features correspond to the most commonly used SQL features:

### Main OData Features

| Feature                         | Microsoft SQL Server   | OData   |
|---------------------------------|--|---|
| Number of records in a table    | SELECT COUNT(*)<br>FROM Emp  | /Emps/\$count   |
| Querying specific table columns | SELECT ENAME, JOB, SAL FROM<br>Emp   | /Emps?\$select=ENAME,JOB,SAL  |
| Querying the second 5 records   | SELECT * FROM Emp ORDER BY<br>(SELECT NULL)<br><br>OFFSET 5 ROWS FETCH FIRST 5<br>ROWS ONLY                              | /Emps?\$top=5&\$skip=5  |
| Ordering Data                   | SELECT * FROM Emp ORDER BY<br>ENAME DESC, SAL  | /Emps?\$orderby=ENAME<br>desc,SAL   |
| Querying joined tables          | SELECT * FROM Dept LEFT<br>OUTER JOIN Emp ON<br><br>Dept.DEPTNO = Emp.DEPTNO   | /Depts?\$expand=Emps  |
| Filtering data                  | SELECT * FROM EMP WHERE<br>(SAL/2 > 500 AND<br>HIREDATE <= '01/01/1985') OR<br>(COMM IS NOT<br>NULL AND ENAME LIKE 'J%') | /Emps?\$filter=(SAL div 2 gt 500<br>and HIREDATE le 1985-01-01) or<br>(COMM ne null and startswith<br>(ENAME,'J'))    |
| Aggregating data                | SELECT SUM(SAL) AS Sum, MAX<br>(SAL) AS Max,<br><br>Min(SAL) AS Min, AVG(Sal) AS<br>Avg FROM Emp                         | /Emps?\$apply=aggregate(SAL<br>with sum as Sum,SAL with max<br>as Max,SAL with min as Min,SAL<br>with average as Avg) |



## Filter Expressions

OData protocol supports a number of different mathematical, logical, etc. operators and functions in the \$filter expression. Here you can find a brief list of these operators and functions that you can use in your OData requests together with their SQL analogs.



These are case-sensitive in OData requests.

### Operators

| Microsoft SQL Server | OData   |
|----------------------|---------|
| =                    | eq      |
| !=                   | ne      |
| >                    | gt      |
| >=                   | ge      |
| <                    | lt      |
| <=                   | le      |
| AND                  | and     |
| OR                   | or      |
| NOT                  | not     |
| +                    | add     |
| -                    | sub     |
| *                    | mul     |
| /                    | div     |
| %                    | mod     |
| ()                   | ()      |
| IS NULL              | eq null |
| IS NOT NULL          | ne null |

## String Functions

| Microsoft SQL Server | OData              |
|----------------------|--------------------|
| REPLACE(X,'Y','Z')   | replace(X,'Y','Z') |
| SUBSTRING(X,2,3)     | substring(X,2,3)   |
| TRIM(X)              | trim(X)            |
| CONCAT(X,Y)          | concat(X,Y)        |

## Date Functions

| Microsoft SQL Server | OData     |
|----------------------|-----------|
| DATEPART(year,X)     | year(X)   |
| DATEPART(month,X)    | month(X)  |
| DATEPART(day,X)      | day(X)    |
| DATEPART(hour,X)     | hour(X)   |
| DATEPART(minute,X)   | minute(X) |
| DATEPART(second,X)   | second(X) |

## Mathematical Functions

| Microsoft SQL Server | OData      |
|----------------------|------------|
| ROUND(X)             | round(X)   |
| FLOOR(X)             | floor(X)   |
| CEILING(X)           | ceiling(X) |

## Affected programs

The following indicates areas in the product that may be affected by implementing this feature:

### Setup programs

Setup Options

*SYSPRO Ribbon bar > Setup*

From **SYSPRO 8 2021 R2**, this program enables you to define your OData endpoint (i.e. the address of the SYSPRO OData layer that will be used to connect to the **SYSPRO OData Service**).

The following setup option is available for configuration within the Connectivity System Setup options (*Setup Options > System Setup > Connectivity*):

- OData endpoint

### Operator Maintenance

*SYSPRO Ribbon bar > Setup > Operators*

From **SYSPRO 8 2021 R2**, this program enables you to define a SYSPRO operator as an OData user and automatically creates the required SQL user within **Microsoft SQL Server** with `READ` access to the relevant SQL tables and databases.

The program includes the following OData options within the **Options** tab of the **Options** pane:

- **OData user**

Once you enable this option for the operator, you can use the **Generate credentials** function to create the associated OData SQL user with `READ-ONLY` permissions.

These new credentials are then populated automatically within the **OData user name** and **OData SQL login name** fields.



This information is stored within the [AdmOperatorPwd](#) table.

- **Send Email**

This lets you email the newly created credentials confidentially (using SMTP) to the email address defined against the operator, including a password reset and resend function in SYSPRO.

- **Configure OData email template**

This lets you define the template to be used when emailing the OData credentials to the operator.

## Company Maintenance

*SYSPRO Ribbon bar > Setup > General Setup*

### ■ SYSPRO Site Licenses

If you have a site license for the **Data Connector - OData** module, then this program includes the license details within the **Modules** pane below existing (i.e. licensed) Connected Services.

### ■ Run Time Product Licenses

If you have a Run Time Product license for the **Data Connector - OData** module, then the **Run Time Products** pane includes the following:

- Run time product code
- Product description
- License number
- License access type (i.e. *Standard* OR *Managed*)

## Company Setup

*Accessible from the company browse function of the SYSPRO login screen*

### ■ SYSPRO Site Licenses

If you have a site license for the **Data Connector - OData** module, then this program includes the license details within the **Registration** tab below existing (i.e. licensed) Connected Services.

### ■ Run Time Product Licenses

If you have a Run Time Product license for the **Data Connector - OData** module, then the **Licensed Run Time Products** screen includes the following:

- Run time product code
- Product description
- License number
- License access type (i.e. *Standard* OR *Managed*)



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