Senturus Analytics Connector

Version 3.1.1

User Guide

SENTURUS

Table of Contents

1. Install and Configure Senturus Analytics Connector

There are two ways to connect from Tableau to Cognos/MicroStrategy using Senturus Analytics Connector. The first option is to use Senturus Analytics Connector as a standalone ODBC driver. The second one is to set up a server-client environment. In a server-client environment, you install Senturus Analytics Connector Server on one or more servers and install Senturus Analytics Connector Client on other computers where ODBC consumers are running.

In the standalone environment, Analytics Connector and Tableau (or other ODBC client application) are all installed on the same computer. Analytics Connector takes queries from Tableau, connects and executes reports on Cognos/MicroStrategy, converts report data into ODBC result and deliveries it to Tableau.

In a server-client environment, Analytics Connector Client and Tableau are installed on the same computer, but Analytics Connector Servers are installed on other computers. Analytics Connector Client also takes queries form Tableau, but it does not connect to Cognos/MicroStrategy servers directly, it connects to Analytics Connector Server and forward quires to it instead. Then Analytics Connector Server connects to Cognos/MicroStrategy servers, executes reports, converts report data into ODBC result and returns it to Analytics Connector Client. And finally Analytics Connector Client forwards the result to Tableau.

The first standalone option is good for deployment within a small group and/or department where users have flexibility to control/edit their own DataSourceConfig.xml.

But for larger or enterprise deployment and/or where access control needs to be placed over DataSourceConfig.xml, the server-client deployment is a better choice.

1.1. Installing Analytics Connector

For information of installing and configuring Analytics Connector, including configure DSN, refer to "Senturus Analytics Connector Installation Guide."
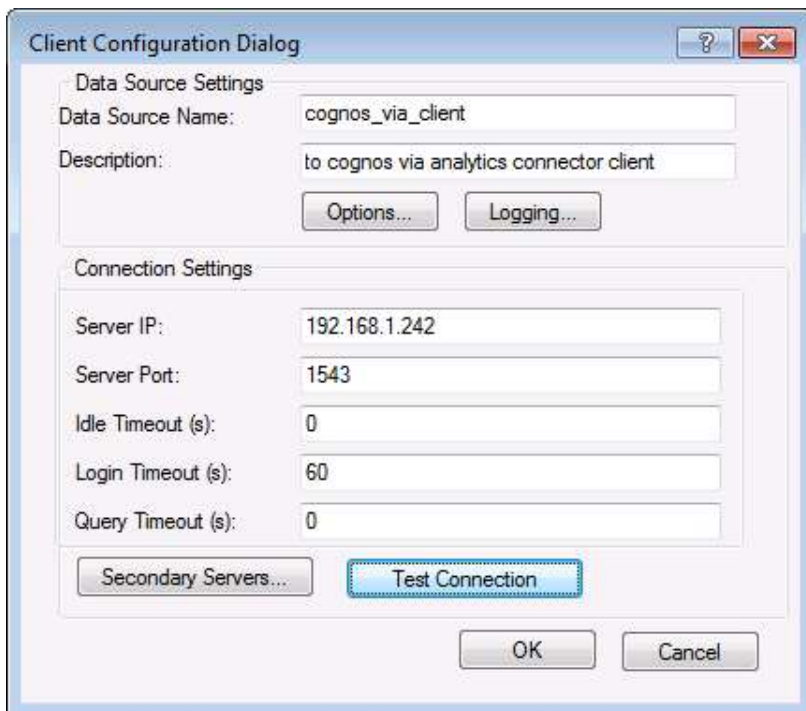
1.2. Installing Analytics Connector Client

Installing Analytics Connector Client is very simple. There is no prerequisite software and the only choice you need to make is the installation directory, default is "C:\Program Files\Senturus\Analytics Connector Client" or "C:\Program Files (x86)\Senturus\Analytics Connector Client" and depends on the driver you are installing.

There is no configuration need and there is no need to apply license key file. License key files are only required on Analytics Connector and Analytics Connector Server.

1.3. Configure DSN Using Analytics Connector Client

To setup a DSN, you need to pick "Senturus Analytics Connector Client" from the driver list. After clicking Finish, the Client Configuration Dialog will pop up.

"Server IP" is the IP or hostname of your Windows server where your Senturus Analytics Connector Server is running, not Cognos/MicroStrategy server. And the port number is the port number you specified during installing Analytics Connector Server, default is 1543.

Click on Options button, here you can add/remove/edit custom properties. These properties are optional. If any values are provided here, those values will be automatically sent to Analytics Connector Server when you connect to this DSN. Otherwise you will be prompted.
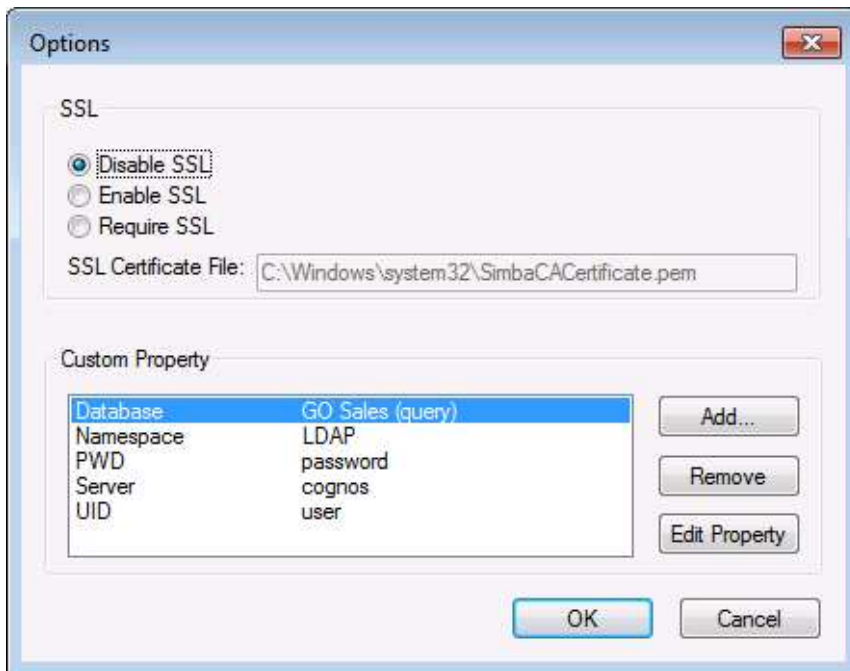
Click on "Secondary Servers…" button, you can provide connection information of more Analytics Connector Server for failover purpose.
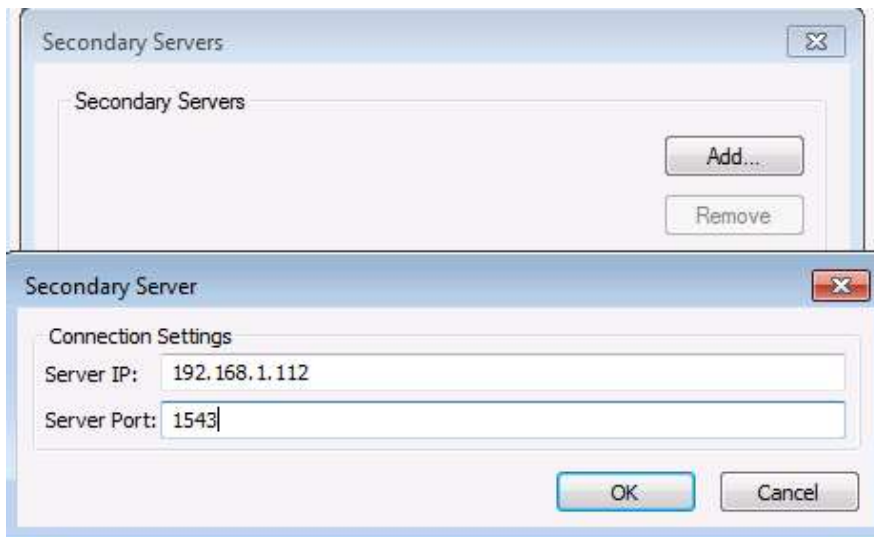
2. Using Analytics Connector in Tableau

Senturus Analytics Connector is designed for Tableau and has been tested against different versions of Tableau, including both Tableau Desktop and Tableau Server on Windows from version 9.3 to the latest 2018.2.

2.1. Connecting to ODBC via Analytics Connector

You can either select a predefined DSN from the DSN list, or select "Senturus Analytics Connector" from the Driver list to connect Cognos/MicroStrategy. You will see the same login dialog, unless you have filled out all information (including user name and password) when configuring your DSN then login dialog be skipped.

The dropdown list in this Server Login dialog reassemble your DataSourceConfiguration.xml.

2.2. Connecting to ODBC via Analytics Connector Client

When connecting to a predefined DSN, you may see the following dialogs.

You will be prompted to select a "Report Server" if you did not define "Server" custom property for this DSN. However, if there is only one server in DataSoruceConfig.xml or Server custom property is set in DSN, this dialog will be skipped.

After selecting Report Server and clicking OK, you will be prompted for further login information. Fill out all information and click OK to connect.

When connecting via Senturus Analytics Connector Client, you need to provide address and port number of Senturus Analytics Connector Server first. So you will see this pop up dialog:

Please note, there is a space between host and port number, NOT a colon mark.

Click OK and you will be connected to Senturus Analytics Connector Server and the following processes and dialogs will be the same as you connecting to DSN.

2.3. Define data source
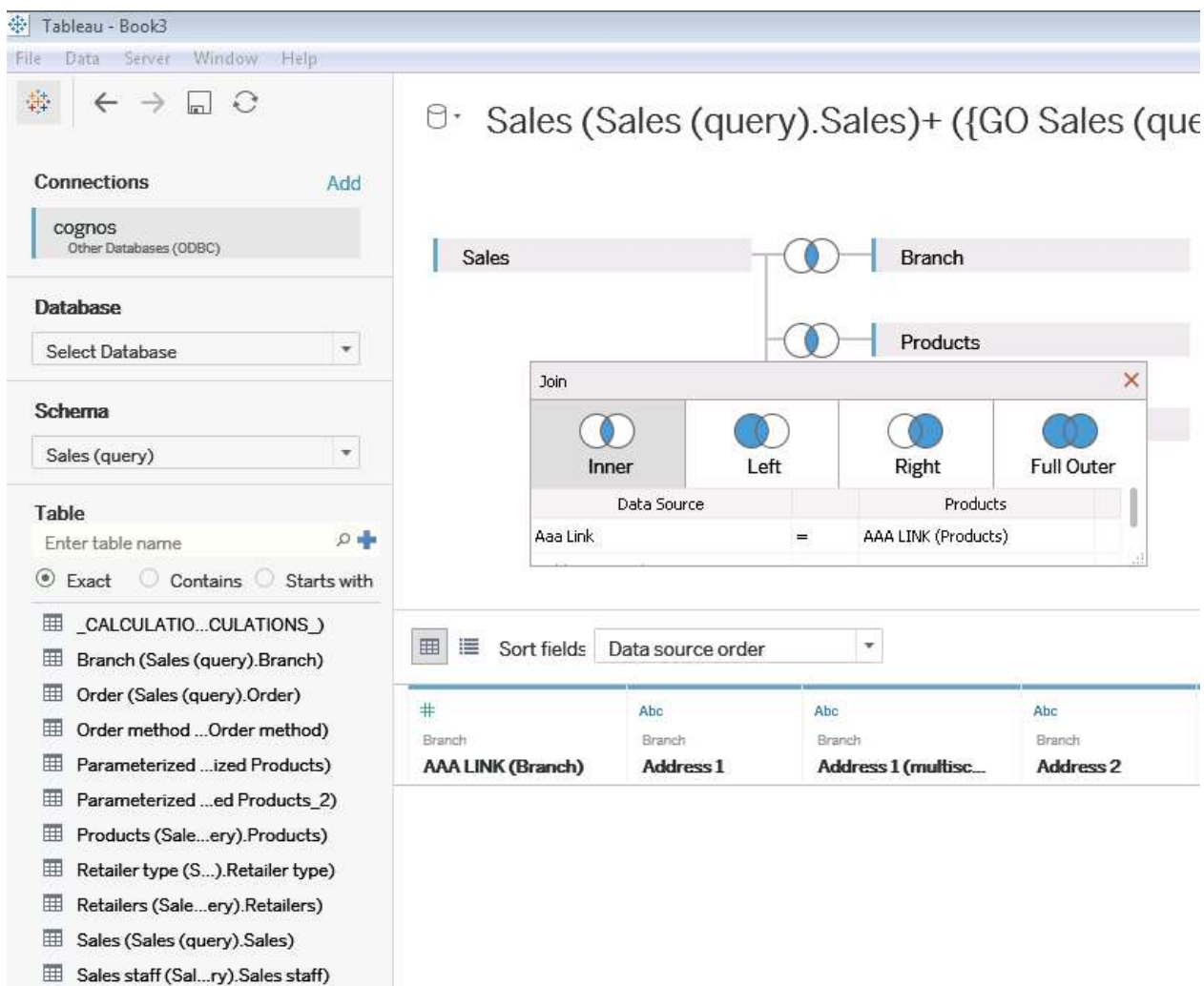
After connecting successfully, you will see schema and tables being populate and you can drop them to data source.

Since Tableau requires mandatory joins among tables but link columns are usually not even available in the those schemas converted from Cognos package or MicroStrategy project, the Analytics Connector creates dummy columns, AAA_LINK or _LINK_COLUMN_ (old name), in each table and Tableau will automatically join them by dummy link columns.

Please note, those dummy joins are present only to satisfy Tableau, they will not be honored by Analytics Connector. Instead, relationships defined within Cognos packages/MicroStrategy projects will be used when executing queries. This is similar to the user experience using Cognos/MicroStrategy reports, you drag columns to reports without defining join and Cognos/MicroStrategy will use their predefined relationships.

- Don't click Update Now button.

Doing so will trigger a query to bring un-aggregated data of all columns from all tables, which may take a very long time.

- "Tableau identified limitation for the ODBC data source" warning.

You may see this pop up when you switch from Data Source tab to a sheet. Tableau uses special features to optimize queries, but Analytics Connector does not support all of them. This is just a warning and your workbook will work just fine. If you want, check "Do not show again for this data source" so it won't pop up next time.

2.4. Define custom joins

As mentioned before, dummy joins will be created automatically when you drag tables into Tableau data source and you usually do not need to change them because you want Cognos/MicroStrategy relationships. However, if you do wish to change them, you can change the dummy joins to custom joins.
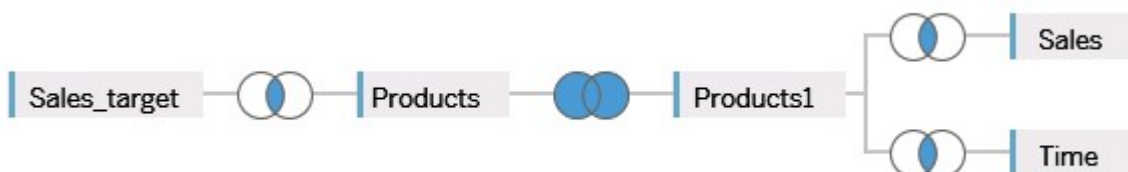
In the example shown above, you can change the dummy join between Products and Products1 to full outer join by "Product Number." This kind of custom join will be honored by Analytics Connector, but after "clustering" tables with dummy joins. Analytics Connector will split the five tables into two sub queries. The first sub query contains Sales_target and Products and the second sub query has Products1, Sales and Time. Afterwards, the two sub queries will be joined together by "Product Number" column.

2.5. Columns

TBD

2.6. Using OpenTable function

(Applies to Cognos connector only.)

Some Cognos data model may embed parameterized filters within certain query subjects, thus Cognos BI Server will prompt users for parameter values if those query subjects are referenced in a report, query and etc. before executing.

Those query subjects will appear in ODBC data source as normal tables, but we cannot add it to workbook directly (Tableau will error out because Cognos will complain missing parameter values). If you do so, you will get an error like "Report '5c56a9ff_6c6d_46c5_a923_b793d6c93cff' request completed but no output generated."

To use such a table in Tableau workbook and pass parameter values, we need to create a Custom SQL and call this table using OpenTable function.

```
OpenTable(
  "Sales (query)"."Parameterized Products",
  "p_product line code"="[991, 992, 993, 994, 995]",
  "p_Product Line"=" 'Golf Equipment '",
  "p_Date"="{d '2010-01-01'}",
  "p_Datetime"="'2010-01-01 19:00:00'"
)
```

The first parameter is "schema name"."table name" followed by zero or more Cognos parameter name-value pairs and separated by commas.

You can use more than one OpenTable function in a Tableau query, as long as each one is contained in individual Custom SQL. And you can mix parameterized tables with other tables in one query.

For more information about the syntax, refer to section Function Syntax.

2.7. Using RunReport function

By defining reportFolder elements under Server/Database in DataSourceConfig.xml, you inform the Analytics Connector to pull reports as tables. But you cannot add them into Tableau workbook directly[1], because most reports may contains parameters. If you do so, you will get an error like ""Sample Reports"."Customer Fulfilment Report" is a Cognos report, please call RunReport() function to execute it."

To use such tables in Tableau workbook and pass parameter values, we need to create a Custom SQL and call this table using RunReport function.

---

[1] The exception is MicroStrategy Intelligence Cube. You can drag a table mapped from an intelligence cube into Tableau data source. But you cannot mix it with other tables or you will get an error.

```
RunReport(
  "Sample Reports"."Sales by Product, Region and Time",
  "p_product line code"="[991, 992, 993, 994, 995]",
  "p_Product Line"="'Golf Equipment'",
  "p_Date"="{d '2010-01-01'}",
  "p_Datetime"="'2010-01-01 19:00:00'"
)
```

The first parameter is "schema name"."table name", followed by zero or more parameter name-value pairs, and separated by comma. Where name is the name of parameter for Cognos connector or the title of parameter for MicroStrategy connector.

For MicroStrategy data source, you can use only one RunReport function in a Tableau query. To join report data with other tables or other reports, consider Tableau data blending or to change your Cognos report design.

For Cognos data source, you are can put multiple RunReport functions in a Tableau query or mix RunReport functions with regular tables.

For more information about the syntax, refer to section Function Syntax.

2.8. Function Syntax

- Syntax

  Both OpenTable and RunReport function adopt following syntax:

  ```
  OpenTable("Schema Name"."Table Name"(, "Parameter"="value")*)
  ```

  The first parameter is a table identifier, using standard SQL syntax. All identifiers are case insensitive and schema name can be omitted if table name is unique cross schemas.

  The second, if any, and following parameters are name-value pairs, separated by commas. Name and values should be surrounded by double quotation marks.

- Parameters

  Use parameter name in place of `"Parameter"` for Cognos connector and use prompt title in place of `"Parameter"` for MicroStrategy connector.

  MicroStrategy supports multiple types of prompts, but the Analytics Connector only fully supports value prompts, attribute element list prompts and object prompts. If there are other types of prompts in your reports that you need to answer, you can use promptsAnswerXML parameter here. For more information regarding promptsAnswerXML and how to generate it, refer to: https://lw.microstrategy.com/msdz/MSDL/GARelease_Current/_GARelease_Archives/940/docs/merged Projects/mobilesdk/topics/iOS/URLAPI/iPh_URLAPI_Answering_All_Prompts.htm.

Please note, you need to escape double quote characters (`"`) in promptsAnswerXML with two double quotes.

- Values

  All values should follow SQL/ODBC standard.

  Only plain string representation is allowed for numeric values, formatted representations (for example `1,200.00` with thousand separators, `(15)` for -15, or percentage `50%`) are not supported.

  For string values, single quotation marks are used around the value, for example `'Golf Equipment'`, `'Sam''s Club'` (note the two single quotes here, it's the SQL standard to escape single quote with two single quotes).

  For data/time/timestamp values, use ODBC standard, for example `{d '2010-01-01'}` or ISO 8601 standard format, `'YYYY-MM-DD'` for date, `'hh:mm:ss'` for time and `'YYYY-MM-DD hh:mm:ss'` for timestamp.

- Character escaping
  In addition to single quotes, double quotes in parameter name and values need to be escaped with two double quotes.

- Passing multiple values to a parameter
  A Cognos parameter may accept multiple values, for example `[Product line code] in (?p_Product line code?)`. To specify multiple values in your function, you put multiple values in a pair of square brackets (`[]`) and separate each value by comma (`,`), just like CSV format.

- Using Tableau parameters
  You can use Tableau parameters in place of literal values, but take the following notes. Tableau will replace parameter name with formatted string when executing a string. For example, it will put single quotes around string values, escape single quotes with two single quotes in string values, format date value using ODBC format. So you do not need to "format" them in function call. Tableau will not escape double quotes, so you need to escape them when you provide values to Tableau parameter.
  Tableau does not support multiple value parameters. If you want to pass multiple values to one Cognos parameter, you need to define multiple parameters in Tableau and put them in your function, for example `"param"="[<Parameters.p1>, <Parameters.p2>, <Parameters.p3>]"`.

3. Using Analytics Connector in Microsoft Power BI Desktop

You have two options when considering using Analytics Connector with Microsoft BI Desktop. The first one is to use it as a generic ODBC driver connecting to DSN, the second option is to use it via custom data connector. Power BI Desktop does not support DirectQuery via generic ODBC, as of June 2018, so it becomes impractical even if you need to connect a fact query subject with a quarter million rows. With a custom data connector, you can set connection mode to DirectQuery thus avoid importing data into report. However, Power BI custom data connector is still a preview feature and our support to this feature is in beta. Also, connecting MicroStrategy to Power BI via data connector is not support at this moment.

3.1. Using Analytics Connector as a generic ODBC driver to DSN

You need first create a DSN, using standalone Analytics Connector as an ODBC driver, or using Analytics Connector Client.

Within Power BI Desktop, click Get Data, then select ODBC and click Connect.
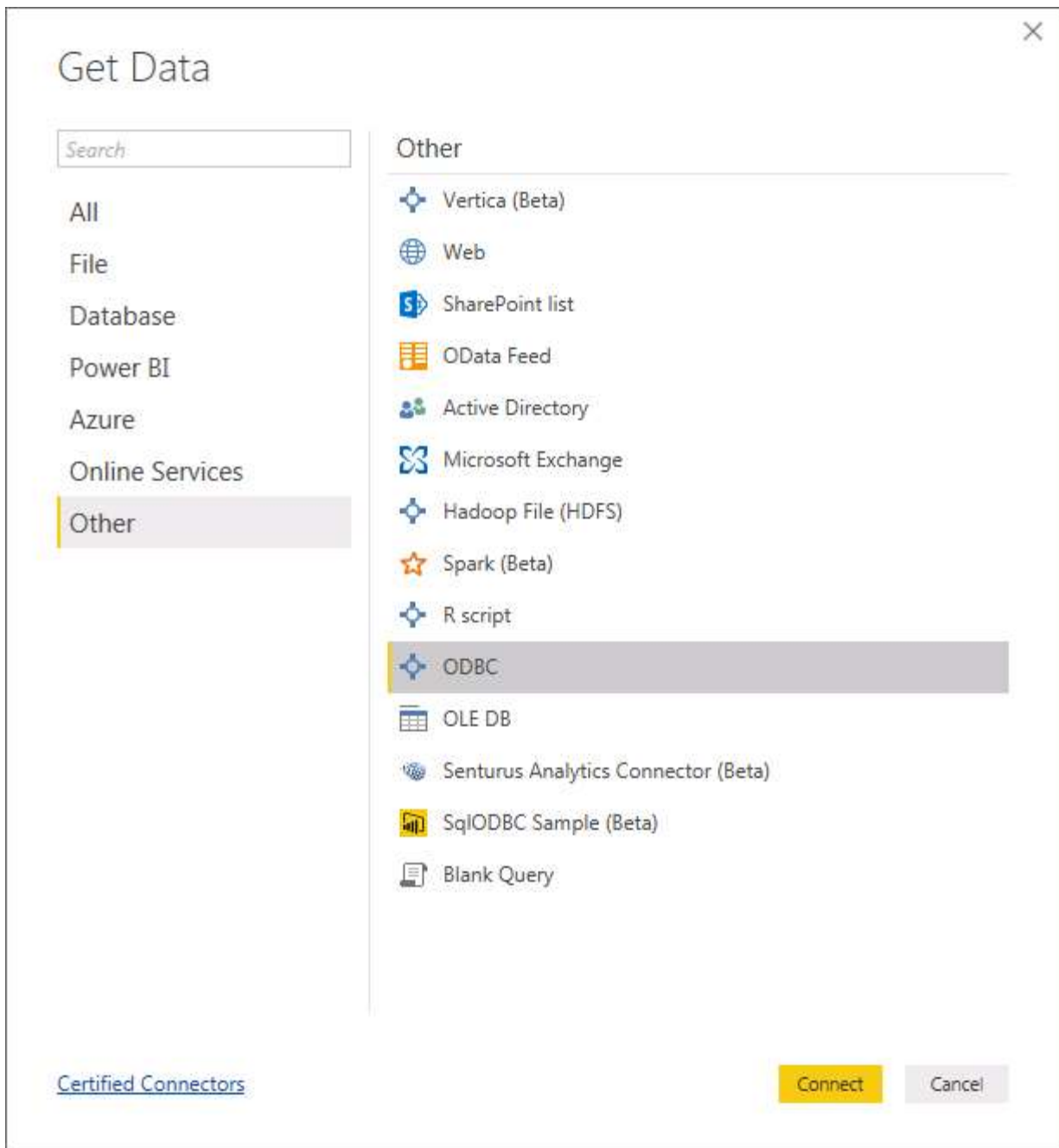
Select your DSN and click on OK.

Senturus Analytics Connector User Guide

Navigate to the schema tree and select tables you want to imported and click on Load.

After all data are imported, you need to go to Relationships tab to review and redefine relationships as needed.

The problem of importing tables has following problems: some tables may be too big to import (millions of rows), and you may not have common column among tables so you cannot define proper relationships.

One workaround is to define a SQL statement when connecting to your DSN, as show here.

The query should return all columns/rows you need and should not be too big to import. You can also execute reports using RunReport() function in your query, as this:

SELECT
    "Table_1"."Product line" AS "Product_line",
    "Table_1"."Product type" AS "Product_type",
    "Report_1"."Revenue"   AS "Revenue_of_2010",
    "Report_2"."Revenue"   AS "Revenue_of_2011"
FROM RunReport("Connector Reports"."Parameter Report", "p_Date"="2010-01-01") "Report_1"
    INNER JOIN (RunReport("Connector Reports"."Parameter Report", "p_Date"="2011-01-01",))
"Report_2" ON ("Report_1"."Product line code" = "Report_2"."Product line code" AND
"Report_1"."Product type code" = "Report_2"."Product type code")
    INNER JOIN "Sales (query)"."Products" AS "Table_1" ON ("Report_1"."Product line code" =
"Table_1"."Product line code" AND "Report_1"."Product type code" = "Table_1"."Product type code")
ORDER BY 1, 2

3.2. Using Analytics Connector via custom data connector

Because of the limitations mentioned before, we developed a custom data connector for Power BI. It allows you connect to Cognos data source via DirectQuery mode.

First, you need to follow steps below to enable it[2]:

1. Create a [My Documents]\Power BI Desktop\Custom Connectors directory.
2. Copy the "C:\Program Files\Senturus\Analytics Connector\PowerBI\SenturusDataConnector.mez" into this directory.
3. (if applicable) Enable the Custom data connectors preview feature in Power BI Desktop (under File | Options and settings | Custom data connectors)
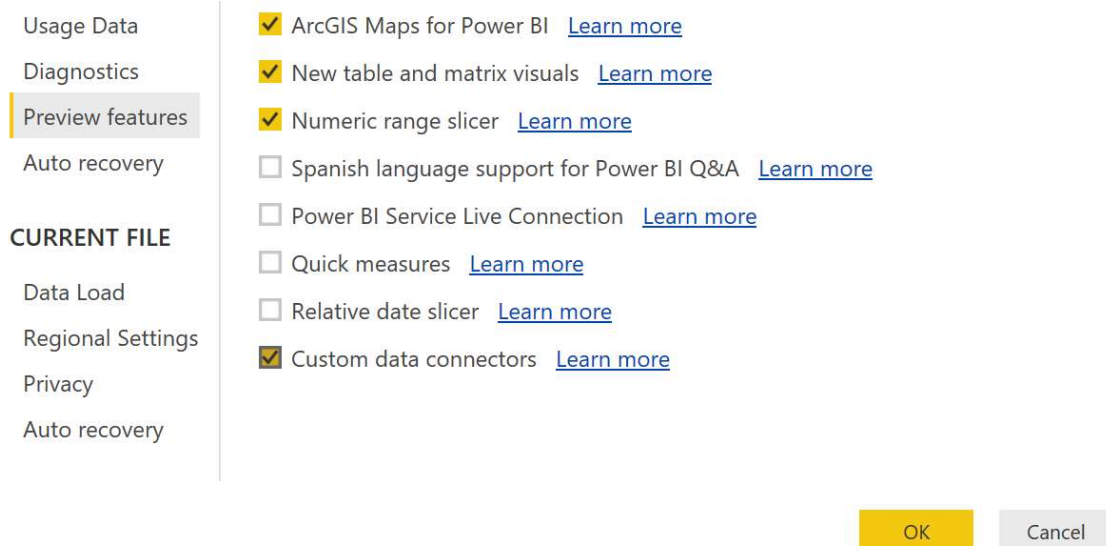

4. (if applicable) Allow any extension to load without validation or warning (under File | Options and settings | Security | Data extensions).

---

[2] When using SenturusDataSourceConfig.exe, SenturusDataConnector.mez will be generated and copied to current user's "My Documents\Power BI Desktop\Custom Connectors" directory, after saving your configuration. So step 1 and 2 can be skipped in this case.
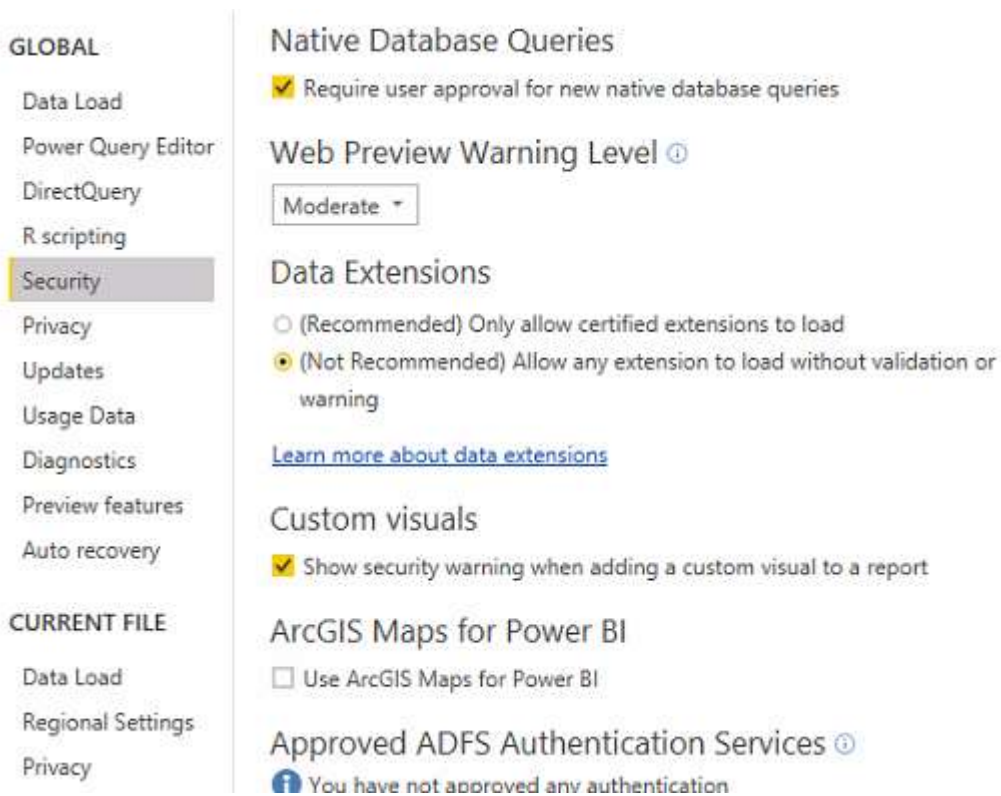
5. Restart Power BI Desktop

Now you can select "Senturus Analytics Connector" from the data source type list, and click on connect.
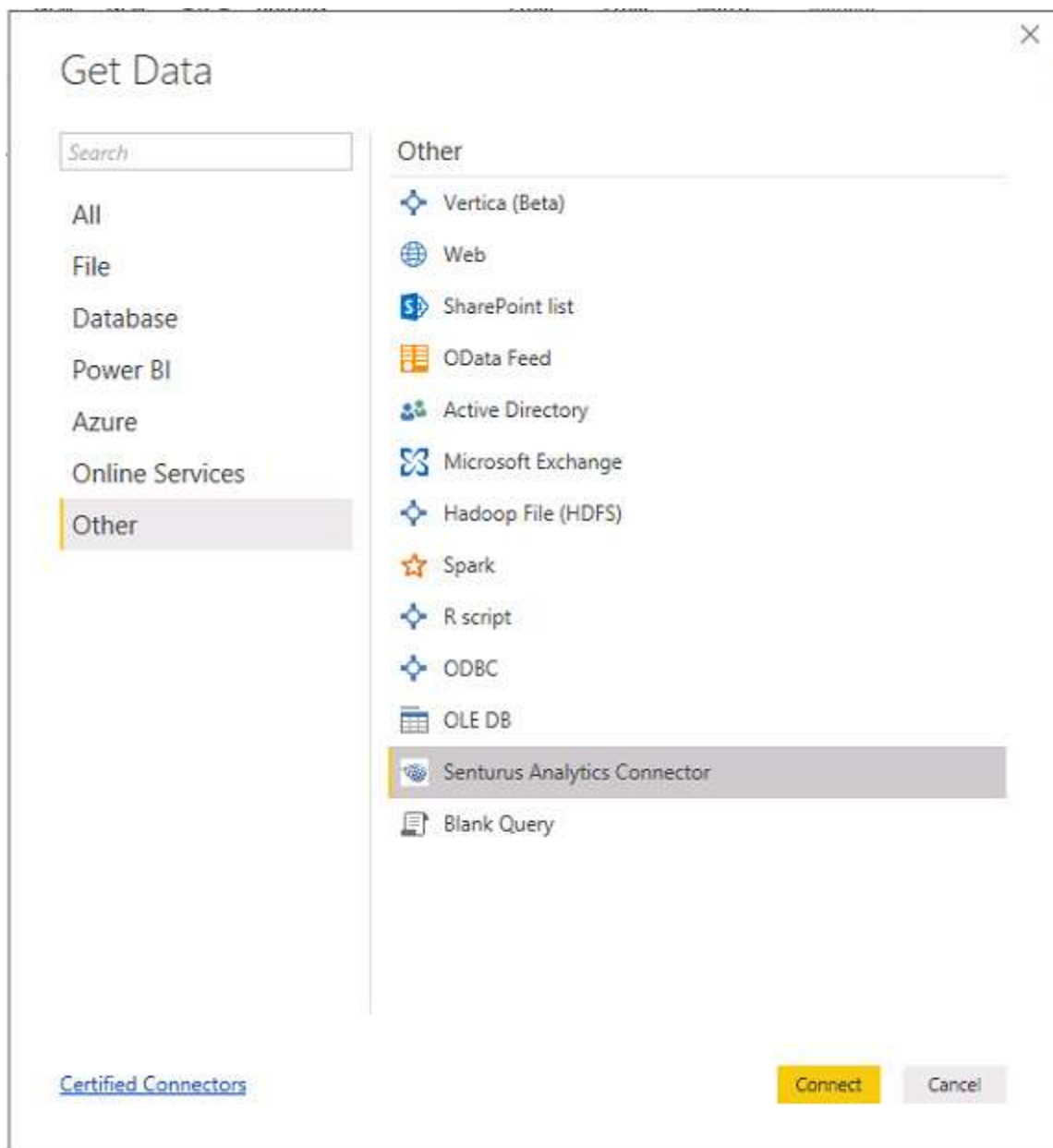
Type in server and database, check DirectQuery and click on OK.

Type in Cognos user name and password and click on Connect.

Navigate to the schema tree and select tables you want to imported and click on Load.

Power BI Desktop won't set relationships automatically, so you need to set them manually. Click on Relationships, drag AAA_LINK column from your fact table to dimension table.

Senturus Analytics Connector User Guide
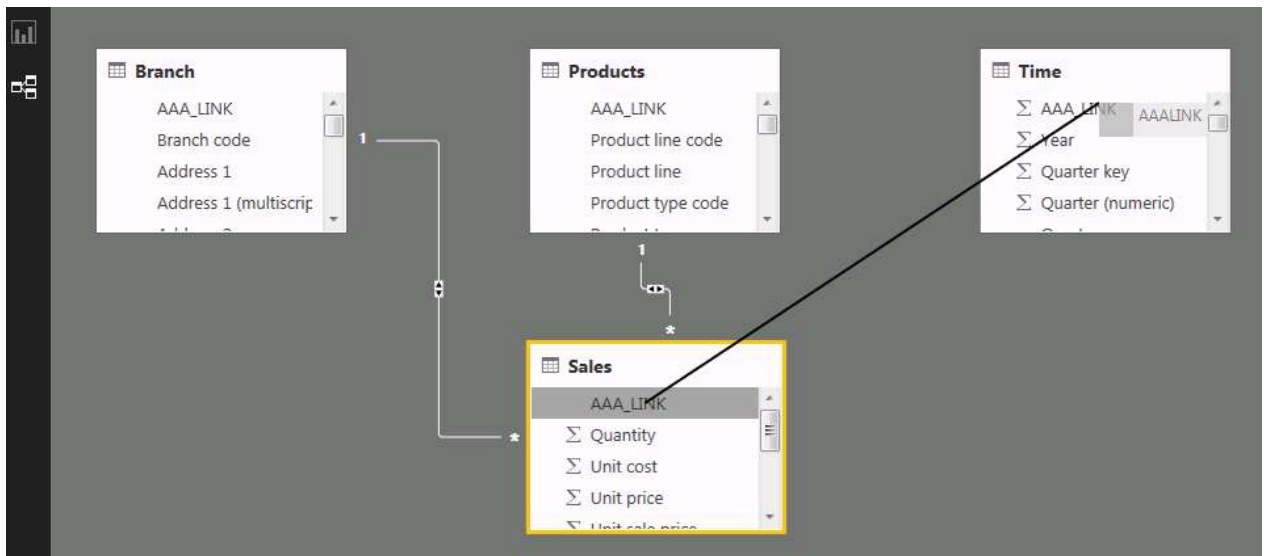
You need to choose "Many to one (*:1)" for Cardinality, and set both for "Cross filter direction", and check optionally you can check "Assume referential integrity".

Those joins are only dummy joins, they tell Power BI to push relationships to data source. When Analytics Connector sees dummy joins, it ignore them. Instead relationships defined within Cognos packages/MicroStrategy projects will be used when executing queries. This is similar to the user experience using Cognos/MicroStrategy reports, you drag columns to reports without defining join and Cognos/MicroStrategy will use their predefined relationships.

You can define custom relationships, please refer to section 2.4 for more information.

Please note, data connector does not work with MicroStrategy data source.

4. Notes

- All identifiers (catalog, schema, table and column names) are case insensitive.

- This ODBC driver support 15 Cognos data types in and 15 MicroStrategy data types. Refer to the data type mapping in following table.

Table 1 Cognos/MicroStrategy to ODBC Data Type Mapping

Cognos Data Type	MicroStrategy Data Type	ODBC Data Type	Max Length/Precision	Note
int16		smallInt	5	
int32	DssDataTypeInteger DssDataTypeUnsigned	integer	10	
int64		bigInt	19	
float32	DssDataTypeReal DssDataTypeFloat	real	7	
float64	DssDataTypeDouble	double	15	
decimal	DssDataTypeNumeric DssDataTypeDecimal DssDataTypeBigDecimal	decimal	38	
character	DssDataTypeChar	char	8000	
characterLength16	DssDataTypeVarChar	varchar	8000	
nChar	DssDataTypeNChar	nchar	4000	
nVarChar	DssDataTypeNVarChar	nvarchar	4000	
date	DssDataTypeDate	date	10	
time	DssDataTypeTime	time	8	no milliseconds
datetime	DssDataTypeTimeStamp	timestamp	19	no milliseconds
textBlob		varchar	8000	mapped to varchar
unknown		varchar	8000	mapped to varchar

- This driver has been tested against SQL Server, DB2 and Oracle databases (relational and DMR model), it may not support all data types/functions for other databases.

- This driver only supports a) packages with one data source or b) packages with multiple data sources, but all database connections are of the same type (e.g. SQL Server native connection). It may work for other packages, but some functions may fail.

- This driver supports the following ODBC features:
  numeric, string, date/time, null literals

cast/convert

simple calculation (+, -, *, /, and %)

string concatenate

and, or, not logical operators

comparison (<, >, =, <=, >=, !=, between, not between, in, not in, like, not like)

is null, is not null

case (if else) statement

parenthesis

sub queries

- This driver support following functions:

  Aggregate function: AVERAGE, AVG, COUNT, MAX, MAXIMUM, MIN, MINIMUM, SUM, TOTAL.

  Numeric functions: ABS, ACOS, ASIN, ATAN, CEILING, COS, COT, DEGREES, EXP, FLOOR, LOG, LOG10, MOD, POWER, RADIANS, ROUND, SIGN, SIN, SQRT, TAN, TRUNCATE.

  Date and timestamp functions: CURRENT_DATE, CURRENT_TIMESTAMP, DAY, DAYNAME, DAYOFMONTH, DAYOFWEEK, DAYOFYEAR, HOUR, MINUTE, MONTH, MONTHNAME, QUARTER, SECOND, TIMESTAMPADD, TIMESTAMPDIFF, WEEK, YEAR.

  Character functions: ASCII, CHAR, CHAR_LENGTH, CHARACTER_LENGTH, CONCAT, LCASE, LCASE, LEFT, LOCATE, LTRIM, LTRIM, REPLACE, RIGHT, RTRIM, RTRIM, SPACE, SUBSTR, SUBSTRING, TRIM, TRIM, UCASE, UCASE.

  Others: CONVERT, IFNULL

Senturus Analytics Connector User Guide