Connecting Pentaho Suite applications with Microsoft SQL Server Analysis Services

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1   Scope of this document

The purpose of this document is to provide an overview of the tests and investigations performed to connect the tools available in Pentaho suite with SQL Server Analysis Services. Our main goal is to demonstrate the possibility of using open source tools to query Microsoft Analysis Services multidimensional structures.

2   Environment

2.1   Software Used

- SQL Server Analysis Services 10.50.16.1671.0 (2008 R2)
- SQL Server Database Engine 10.50.16.1671.0 (2008 R2)
- Internet Information Services (6.1)

2.2   Prerequisites

Configure HTTP Access to Analysis Services on Internet Information Services (IIS)
You can enable HTTP access to Analysis Services by configuring MSMDPUMP.dll, an ISAPI extension that runs in Internet Information Services (IIS) and pumps data to and from client applications and an Analysis Services server. This approach provides an alternative means for connecting to Analysis Services when your BI solution calls for the following capabilities:

- Client access is over Internet or extranet connections, with restrictions on which ports can be enabled.

- Client connections are from non-trusted domains in the same network.

- Client application runs in a network environment that allows HTTP but not TCP/IP connections.

- Authentication methods other than Windows integrated security are required. Specifically, you can use Anonymous connections and Basic authentication when configuring Analysis Services for HTTP access. Digest, Forms, and ASP.NET authentication are not supported.

- Client applications cannot use the Analysis Services client libraries (for example, a Java application running on a UNIX server). If you cannot use the Analysis Services client libraries for data access, you can use SOAP and XML/A over a direct HTTP connection to an Analysis Services instance.

This topic explains how to set up HTTP access to an Analysis Services instance using IIS 7.0. These instructions are valid for any supported version or edition of an Analysis Services instance that interfaces with IIS 7.0, including SQL Server 2012, SQL Server 2008 R2, SQL Server 2008, and SQL Server 2005. HTTP access is supported for both tabular mode and multidimensional mode servers.
…
Full reference here:
http://technet.microsoft.com/en-us/library/gg492140.aspx

After configuring IIS and XMLA HTTP access to SQL Analysis Services we should perform a test in a web browser with the following URL: http://localhost/OLAP/msmdpump.dll. If browser returns a SOAP response access was successful

```
<soap:Envelope>
    <soap:Body>
        <soap:Fault>
        <faultcode>XMLAnalysisError.0xc10e0002</faultcode>
        <faultstring>Parser: The syntax for 'GET' is incorrect.</faultstring>
            <detail>
            <Error ErrorCode="3238920194" Description="Parser: The syntax for 'GET' is incorrect." Source="Unknown" HelpFile=""/>
            </detail>
        </soap:Fault>
    </soap:Body>
</soap:Envelope>
```

3   Data Sources used in the document

In the present paper we will use as data sources two MDX queries (Multidimensional Expressions is a query language for OLAP databases), both queries get data from Adventure Works Analysis Services sample database.

Query 1

```
SELECT [Measures].[Internet Order Quantity]  ON COLUMNS,
[Date].[Calendar Year].Children ON ROWS
FROM [Adventure Works]
```

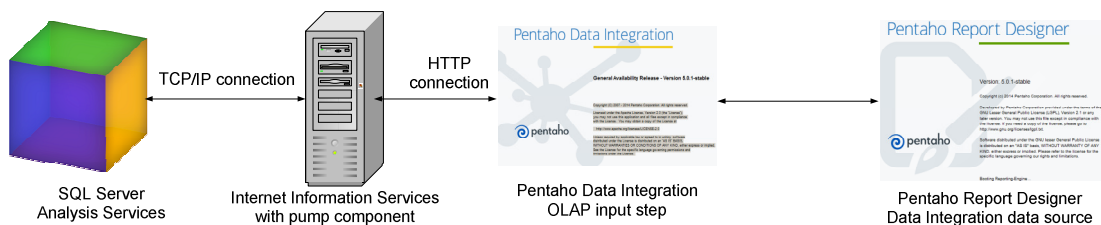### Result set

Calendar Year	Internet Order Quantity
CY 2005	1.013
CY 2006	2.677
CY 2007	24.443
CY 2008	32.265
CY 2010	

Query 2

```
SELECT { [Measures].[Sales Amount], [Measures].[Tax Amount] } ON COLUMNS,
{ [Date].[Fiscal].[Fiscal Year].&[2008], [Date].[Fiscal].[Fiscal Year].&[2009] } ON ROWS
FROM [Adventure Works]
WHERE ( [Sales Territory].[Southwest] )
```

Result set

Fiscal Year	Sales Amount	Tax Amount
FY 2008	10.510.853,88 €	840.868,3 €
FY 2009	9.155,3 €	732,42 €

4 Pentaho Data Integration

In this initial test we will use Pentaho ETL tool to get data from SQL Analysis Services. Below is the connection diagram.

| SQL Server Analysis Services | Internet Information Services with pump component | Pentaho Data Integration OLAP input step |
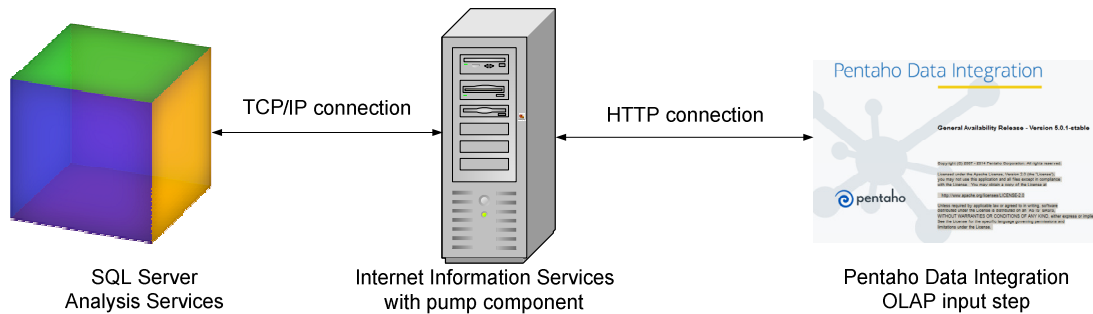
We will be able to connect to Analysis Services using Pentaho Data Integration version 4.4.0 CE (or 5.0.1 CE) by means of its OLAP input step and filling the following grids:

- XML/A Url: http://localhost/OLAP/msmdpump.dll
- Username/Password: Windows user account and password
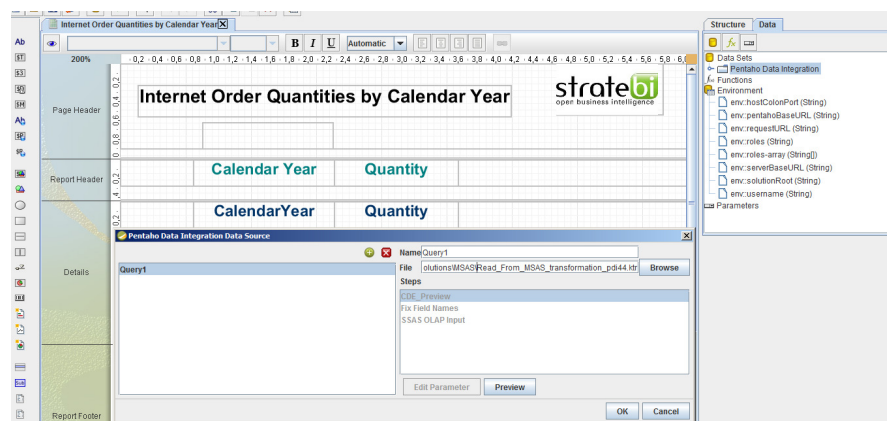- MDX Query: Used MDX Query 1
- Catalog: Adventure Works 2008 R2 SE

5   Pentaho Report Designer

Now our intention is to connect to cubes of Analysis Services using Pentaho Reporting capabilities. For this purpose we have two types of data sources available in Report Designer, first is using a Pentaho Data Integration transformation, this data source works both in Pentaho Reporting 3.9.1 and 5.0.1. However, if we decide using a generic connection and OLAP4J driver only works in PRD 5.0.1 version (see bug existent in 3.9.1 edition here http://jira.pentaho.com/browse/PRD-3697). In both cases we are using MDX Query1 as data stream.

1a) Pentaho Data Integration Data Source

1b) Report creation screenshot

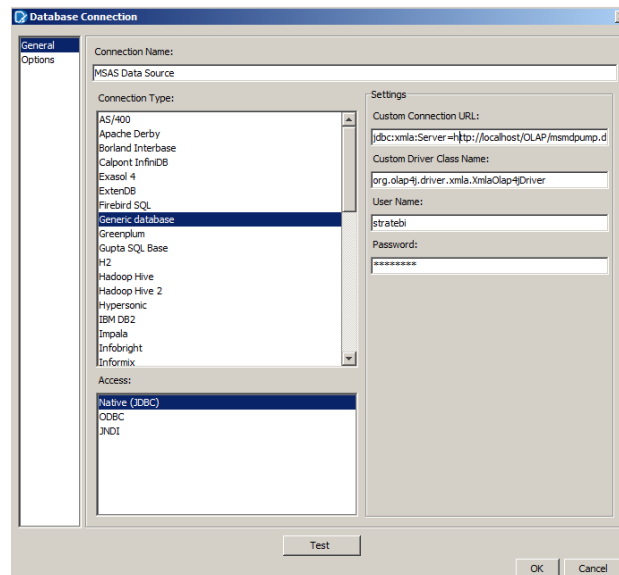2a) OLAP4J Data Source

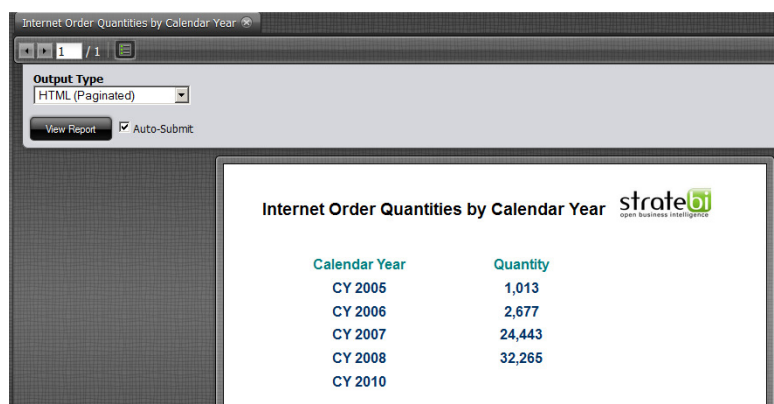| SQL Server Analysis Services | Internet Information Services with pump component | Pentaho Report Designer OLAP4J data source |
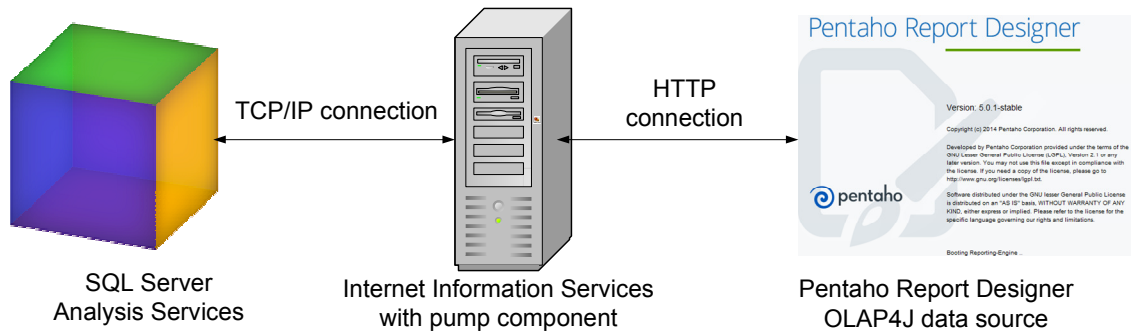
2b) OLAP4J connection details

Report execution in Business Intelligence Server User Console

6 STPivot

In this case our aim is to connect STPivot OLAP viewer with Analysis Services cubes. In order to accomplish this task we will use an action sequence (Action Sequences define lightweight process flows within the Pentaho BI Server). As process action we need to use Pentaho Analysis Viewer to invoke STPivot and thus obtain OLAP capabilities (drill down, filtering, statistics).
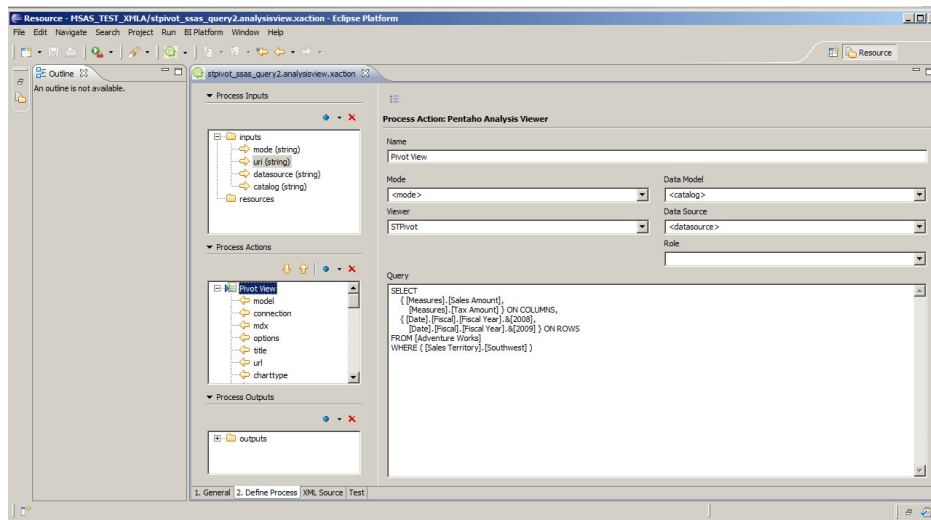

To create the action sequence we use Pentaho Design Studio. First, we need to set three input variables: uri, datasource and catalog.

Action sequence - url input screenshot
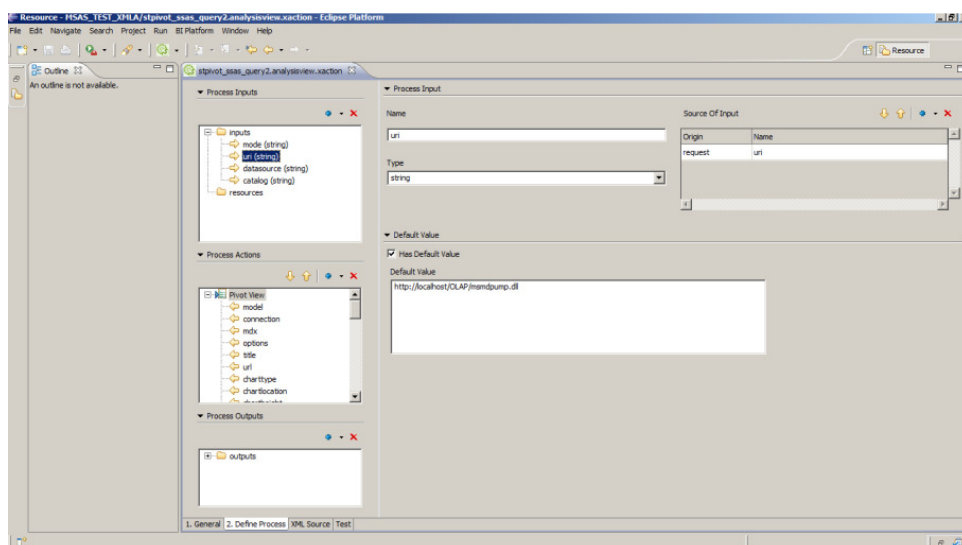
Then as process action we choose Pentaho Analysis Viewer and apart from setting the MDX query we need to select STPivot as viewer.

Action sequence – process action screenshot

The action sequence previously created is valid both for Pentaho 4.8 and 5.0.1 editions.

Once logged in the platform we could execute the action sequences created and acquire all OLAP capabilities provided by STPivot: Drill, Filter, Charts, Calculator, What If Analysis…
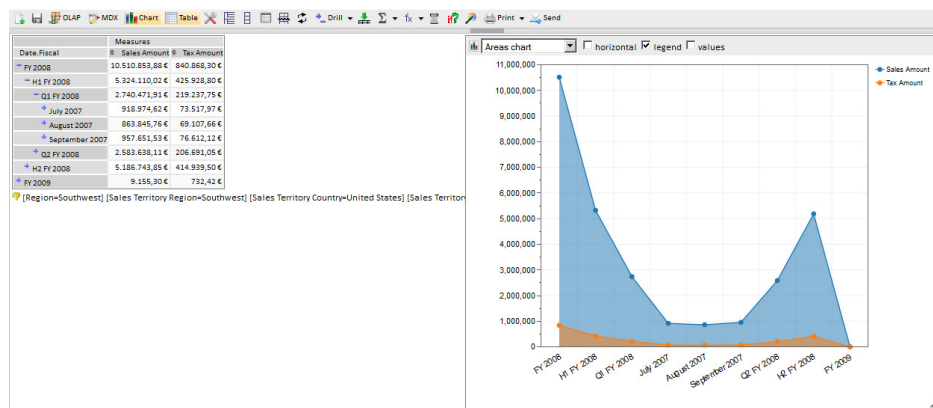
STPivot OLAP and table view in Pentaho 4.8

Furthermore we could export our OLAP views in PDF, Excel and CSV formats.

STPivot table and chart view in Pentaho 4.8

STPivot OLAP, table and chart view in Pentaho 5.0.1
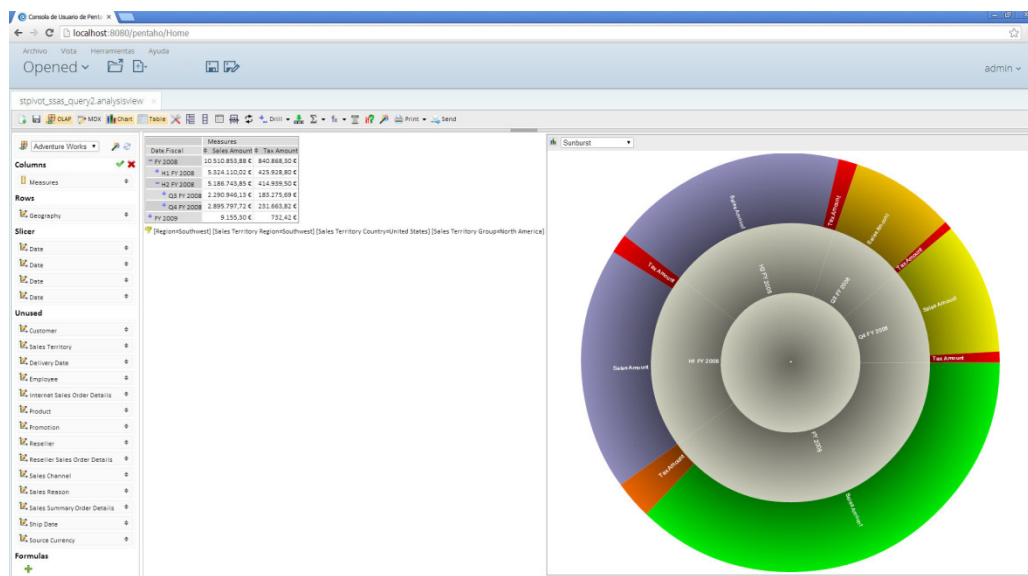
7   Community Dashboard Editor

In this case our aim is to create a dashboard which gathers information from Analysis Services cubes, after several failed attempts with CDE OLAP4J queries, we managed to create the dashboard using as data source the previously used Kettle transformation.
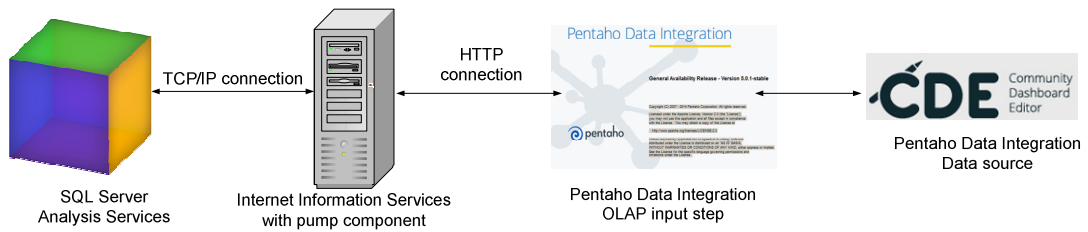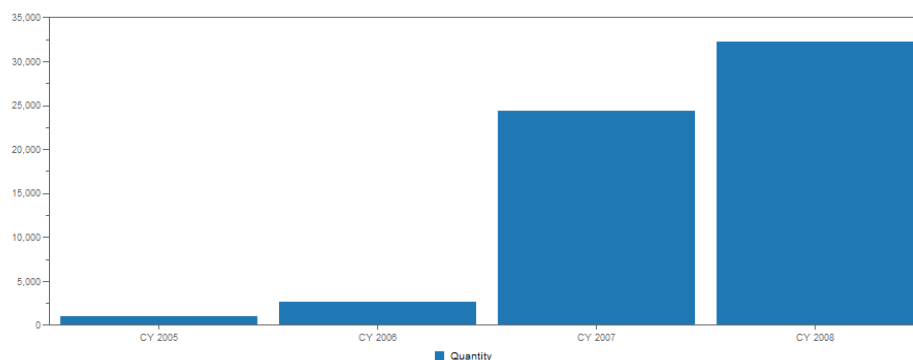
CDE Data source configuration
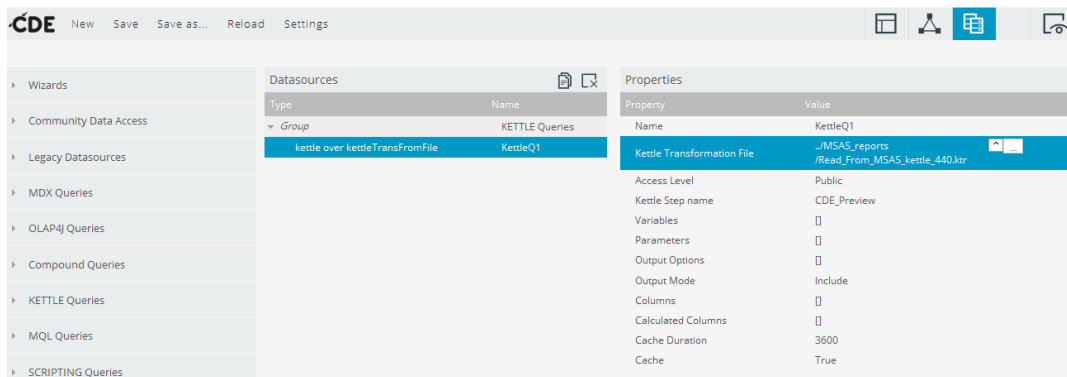
For this paper we have designed a simple dashboard that includes a Bar Chart with Calendar Year as category and Internet Order quantities as values.

CDE dashboard

8   Summary table of tests performed

Tool	Works	Version	Notes
Reporting	No	4.8	OLAP4j data source, bug fixed in next release http://jira.pentaho.com/browse/PRD-3697
Reporting	Yes	4.8	Using Kettle transformation as Data Source
Reporting	Yes	5.0.1	OLAP4j data source
Reporting	Yes	4.8	Using Kettle transformation as Data Source
Kettle	Yes	4.4.0	OLAP Input step
Kettle	Yes	5.0.1	OLAP Input step
CDE	Yes	5.0.1	Using a Kettle transformation as Data Source
STPivot	Yes	4.8	Using an xaction with parameters uri http://localhost/OLAP/msmdpump.dll datasource Provider=MSOLAP.4;Data Source=local catalog Adventure Works DW 2008R2 SE
STPivot	Yes	5.0.1	Using an xaction with parameters uri http://localhost/OLAP/msmdpump.dll datasource Provider=MSOLAP.4;Data Source=local catalog Adventure Works DW 2008R2 SE