Business Intelligence Integrated Solutions

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Abstract

This paper shows how businesses make decisions better and faster in terms of customers, partners and operations by turning data into valuable business information. The paper describes how to bring together people's and business intelligence information to achieve successful business strategies. There is the possibility of developing business intelligence projects in large and medium-sized organizations only with the Microsoft product described in the paper, and possible alternatives can be discussed according to the required features.

1. Introduction

Data Mining, also known as data or knowledge discovery, is "the process of analyzing data from different perspectives and synthesizing them into useful information that is used to increase revenue or reduce costs" (Frand, 2016, p.3) . From a technical point of view, Data Mining allows the discovery of connections or patterns among dozens of fields in large relational databases. Data Mining is currently used primarily by companies that place a strong user focus, such as retail, financial services, communications and marketing organizations. This technique enables them to establish the links between internal factors such as price, product or staff positioning, and external factors such as economic indicators, competition, turnover effects, customer satisfaction and business profits (Kurz, 2011 , p. 11).

2. Reporting Services

SQL Server Reporting Services (SSRS) is a reporting software and can be used to prepare and deliver a multitude of interactive and dedicated reports (Azevedo et al, 2006, p.36). It is managed through a Web interface and provides a Web Services interface for developing customer-specific reporting applications. SSRS competes with Crystal Reports and other business intelligence tools. Reports are defined in Report Definition Language (RDL), an XML-Markup language. Reports can be used with the newer versions of Microsoft Visual Studio, which are installed with the provided business intelligence plug-in, or with the provided Report Builder tool. Reports defined with RDL can be done in a variety of formats, including Excel, PDF, CSV, XML, TIFF, and HTML-Web. SSRS can also run reports in Microsoft Word (DOC) format.

2.1. Report Server

In this section we will first explain the use of Reporting Services, report server, and see how to build a chart report in SQL Server Reporting Services. For this demonstration we will use the AdventureWorks example database from Microsoft. To configure this report, we open Visual Studio Business Intelligence Studio and create a new Report Server project. As soon as the project

is ready, we set up a data source that allows data to be retrieved from the AdventureWorks Database.

For the data selection we write the following query:

```
SELECT YEAR(SOH.OrderDate) OrderYear,PC.NAME AS CategoryName,PSC.NAME as
SubCategoryName,SUM(UnitPrice) TotalPrice, SUM(OrderQty) TotalOrders
FROM Production.ProductCategory PC INNER JOIN Production.ProductSubcategory
PSC ON PC.ProductCategoryID=PSC.ProductCategoryID
INNER JOIN Production.Product P ON
PSC.ProductSubcategoryID=P.ProductSubcategoryID INNER JOIN
Sales.SalesOrderDetail SOD ON P.ProductID=SOD.ProductID
INNER JOIN Sales.SalesOrderHeader SOH ON SOH.SalesOrderID=SOD.SalesOrderID
GROUP BY YEAR(SOH.OrderDate), PC.Name,PSC.Name
ORDER BY OrderYear,CategoryName,SubCategoryName
```

If we run this query, we should get the following result, as shown below.

Figure no. 1 Report Manager subreport

	OrderYear	CategoryName	SubCategoryName	TotalPrice	TotalOrders
1	2001	Accessories	Helmets	6983.8561	1003
2	2001	Bikes	Mountain Bikes	1995907.6076	2415
3	2001	Bikes	Road Bikes	3944233.0833	4724
4	2001	Clothing	Caps	761.8968	520
5	2001	Clothing	Jerseys	9945.6118	983
6	2001	Clothing	Socks	690.08	629
7	2001	Components	Mountain Frames	204504.5924	495
8	2001	Components	Road Frames	129765.374	1079
9	2002	Accessories	Helmets	17531.3036	3830
10	2002	Accessories	Locks	2217.00	676

2.2. Report model projects

SQL Reporting Services uses report models by which administrators include items in the database in their reports. For the user, the report is simpler because, due to the report model offered, it can only choose certain perspectives and notions. For model-based reports, at least one report model needs to be available. It is necessary to draw up certain reports quickly.

These report formats are required to quickly access a particular business situation. For this reason, there is a very important feature in SSRS, called Report Builder. With the Report Builder, ad-hoc reports can be produced. A report model contains metadata of the data source and the links between them. These metadata are in SMDL (Semantic Model Definition Language). This is a form of presentation of the model concepts based on XML (Azevedo et al, 2006, p.39). Models can be developed with a report manager or Microsoft Office SharePoint Server, but BIDS offers maximum flexibility. The model can be developed, if necessary, based on cubes analysis services. If the cube is modified later, the model must also be regenerated. Report models based in Analysis Services-Cubes can not be drawn with the Designer. The reference models consist of the following components:

• entities: similar to the objects in the tables (entities have features and roles);

• features: similar to the columns in the tables;

• roles: indicates relationships between entities;

• Folder: used for organization of entities and perspectives in order to summarize certain models of notions;

• Perspectives: Partial quantity of the model, it is useful when there are very large models and perspectives included in entities, roles, folders, etc.

In order to be able to prepare ad-hoc reports, a new draft report model must first be written in Business Intelligence Studio in Visual Studio. In this, it is necessary, as in the report server project, to establish a data source and build a picture of the data source. Here, the necessary tables are added to the model to be used for ad-hoc reporting, and aggregations such as sums, average values, or the minimum of selected attributes are created in advance. After preparing the model, it can be accessed through the Report Manager (http://[localhost]/Reports).

Figure no. 2 Microsoft SQL Server Report Builder

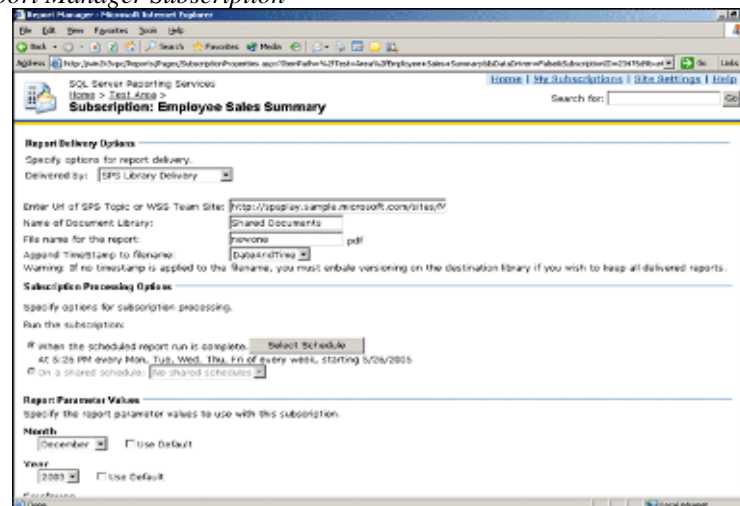It is also possible to create graphs directly in the Visual Studio designer. The report image, created like this, also appears in a web browser or report manager. Functionally there is no difference to the reports that were created as a report server project.

3. Subscriptions

A subscription is "a requirement to transmit a report in a previously used data format at a given time or as a reaction to an event" (Sallam et al, 2011, p.137). Subscriptions become an alternative to executing a report when needed. Every time, when a report is needed, the report must be selected manually. For such situations, subscriptions can be used to plan and automate the execution of a report. Subscriptions are processed and distributed on the delivery extensions of the Report Server provided by SQL Server. Standard subscriptions can be made to send reports to an approved folder or an email address. If a report is configured for SharePoint integrated mode, it can also be sent to a SharePoint library. When creating a subscription, you must find stored access identifiers within the report, but you also need to have the right to display the report and make the subscription. In addition, scheduled activities and report preparation within the reporting server must be enabled.

Figure no.3 Report Manager Subscription

Reporting Services supports two types of subscriptions: standard subscriptions and data-generated subscriptions. Standard subscriptions are designed and managed by individual users. A standard subscription contains statistical values that can not be different during the subscription processing. For each standard subscription, a variety of presentation possibilities, delivery possibilities, and report parameters are available.

Data-generated subscriptions access subscription information by consulting an external data source that provides values for a receiver, report parameters, or an application format. Data subscriptions can be used if a very large recipient list is available or if different reports are to be

issued for different target groups. Data-driven subscriptions require knowledge from the consultation and use of the parameters. Normally, these subscriptions are set up and administered by report server administrators.

Subscriptions use delivery extensions to determine how and in what format the report should be issued. If a report is to be written, the user may choose one of the available delivery extensions to determine the mode of transmission. Developers can build additional extensions to forward reports to other destinations or other targets. Reporting Services includes the following delivery extensions:

Table no.1 Delivery extensions for subscriptions

Extensie de transmisie	Descriere
Windows-file sharing	Sends a report as a static application directory to an approved folder that is accessible through the network.
E-Mail	Forward an info or report as an email or URL link.
SharePoint library	Sends a report as a static application folder to a SharePoint library that is accessible through a SharePoint website. The website must be integrated into a report server that is executed in integrated SharePoint mode.
Zero	The ZERO transmission bidder is a highly specialized extension that is used to preload a cache with parameterized reports ready for display. This procedure is not available to users in the case of individual subscriptions. ZERO transmission is used by administrators subscriptions generated data to improve server performance report prior to uploading the data cache.

Source (Sallam *et al*, 2011, p.152)

4. Alternative to KPI's from Analysis Services

This section explains how key performance indicators are displayed in various conditions in SQL Server Reports. For this demonstration we chose the Northwind database. Integration of key performance indicators into a report is a common requirement formulated by CFO, CEO and stakeholders in a firm in each department. SQL Server offers various possibilities to integrate indicators into a report (Schultz et al, 2008, p.11). In the following demonstration, one of them uses a report to configure. The next KPI is built using a part of SQL Servers -Visual Studio. The following is a query that is used for the draft report..

```sql
USE Northwind
GO

SELECT E.City 'Employee City', YEAR(O.RequiredDate)
OrderYear,COUNT(O.OrderID) 'Total Orders',
SUM(OD.UnitPrice * OD.Quantity) 'Total Sales'
FROM Orders O INNER JOIN [Order Details] OD
ON O.OrderID = OD.OrderID
INNER JOIN Products P
ON OD.ProductID = P.ProductID
INNER JOIN Employees E
ON O.EmployeeID=E.EmployeeID
where E.City='LONDON'
GROUP BY E.City,P.ProductName,YEAR(O.RequiredDate)
```

The query above selects the city of the employee, the desired term, the total of an employee's orders and the total turnover, grouped by city, product name and date. This query selects data only for "London". The result is shown in the following figure.

Figure no.4 Report Manager – raport

	Employee City	OrderYear	Total Orders	Total Sales
1	London	1996	1	249.60
2	London	1996	1	240.00
3	London	1996	1	588.00
4	London	1996	1	2176.00
5	London	1996	2	504.00
6	London	1996	4	1550.40
7	London	1996	1	864.00
8	London	1996	1	316.80

At this point indicators can be entered in the report. Indicators may be colors or images. There is also the possibility to use gadget images to display indicators.

5. Conclusions

A business intelligence solution helps the user to pursue the following critical goals within an organization: reaching or exceeding profit figures; maximizing profitability by identifying the most profitable programs, finding cost-cutting opportunities across the organization, avoiding over-reliance on IT resources, making business teams more confident in their own efforts, faster and more efficient IT customer engagement, and developing a 360 degree customer-oriented summary.

A business intelligence solution enables business teams to understand data interrelations across the organization and synthesize results, trends and forecasts in comprehensive analysis to understand the implications of this approach in-depth on the organization's goals. Business intelligence users understand what happened, what is happening and what steps to take in the future.

6. References

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