

Report
on
Microsoft SQL Server 2005: The Latest in Business Intelligence Tools

submitted to:
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Abstract

Microsoft recently released their newest database engine and the integrated Business Intelligence tools, SQL Server 2005. The release contains many changes and additions to the previous version, SQL 2000; many new analytical tools were added. In the latest release, it is clear Microsoft placed immense priority in research and development for their Business Intelligence tools. This document also explores a third party scorecard application from AIM Technologies and the following Microsoft BI (Business Intelligence) software components.

- SSIS (SQL Server Integration Services)
- SSRS (SQL Server Reporting Services)
- SSAS (SQL Server Analytical Services).
- Scorecard, AIM Technology

BI (Business Intelligence) is important for businesses to understand their customers and monitoring/measuring business goals. With the evolution of technology, the Information Technology community can now place more emphasis and time analyzing and understanding data, rather than spending the time building, configuring and setting up systems and networks; platforms and software require less time to build than six years ago. Business Intelligence tools are important for understanding data while ultimately analyzing and understanding business goals, monitoring internal performance, measuring results and measuring customer satisfaction. Microsoft clearly understands the importance of data analysis and this vision is realized in Microsoft's release of SQL 2005.

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INTRODUCION

Business Intelligence (BI) is not a new subject but, the tools to bring massive amounts of heterogeneous data together, manipulate and display the data has just arrived in Microsoft SQL 2005. This SQL release allows business analysts to spend less time getting the data they want and more time analyzing their data. Only six years ago what would take developers and database administrations months to produce can now be put together in weeks or even days. Technology now rapidly produces results; finally approaching the quick turnaround times business analysts and data driven information groups require.

In its simplest form, Business Intelligence takes data from numerous business sources (i.e. other databases, mainframes, files, spreadsheets, etc.), transforms that data as needed, applies the necessary business rules to change the data and finally presents reports and/or interactive applications for analysis, such as a scorecard. The ability to ETL (extract, transform and load) is at the foundation Microsoft's Business Intelligence, SSIS. The ETL process makes available data to measure business metrics, objectives and goals. Examples of metrics and goals can be viewed in ([Appendix A: SSIS, ETL](#)). Notice the three important elements of the illustration: organizational hierarchy, actual key performance indicator and metric goals.

These web based scorecards, which are filled with business metrics/key performance elements (KPE) are usually the end product of a standard business intelligence platform. This view of the business data allows different people throughout an organization selectively view the business data important to them; by slicing through cubes by something called dimensions. Microsoft

delivers a powerful BI development and deployment environment, which makes creating, deploying and managing BI applications easier than ever before.

Background

In the last six years Microsoft's SQL (structured query language) database platform changed the way database administrators, developers and data warehouse staffs work with data. Microsoft's SQL 2000 (released in 2000) introduced two major components that accelerated the transformation and roll-up of data: Data Transformation Services (DTS) and Analysis Services. These two components were a breakthrough in the ease of use and functionality; you could create a job to pull millions of rows of filtered data within minutes. The two tools coupled with Microsoft's database engine, SQL 2000, began Microsoft's push forward into the Business Intelligence space. The evolution of business intelligence and the tools required for data analysis is now realized in Microsoft SQL Server 2005.

The three significant Microsoft BI components of this release are: SQL Server Integration Services (SSIS), SQL Server Analysis Services (SSAS), SQL Server Report Services (SSRS). One of the widely used purposes of all of these tools is to produce what is known as a business scorecard. A scorecard is usually a web based application of various KPIs, the business community finds useful through KPIs, stratified by dimensions. The intention of this report is to provide brief descriptions of the various Microsoft BI components used in producing a Business Intelligence scorecard application.

Business Intelligence Application Information

SQL Server Integration Services, SSIS

The foundation of BI is SSIS. This programming environment allows SQL 2005 to perform ETL (extract, transform and load) functions through object based programming. Programming can be as easy as dropping two objects ([Appendix B: SSIS, ETL, SSIS Objects](#)) on a programming

palette and connecting the two with a data movement arrow. Objects are visual representation of programming code, logic, methods and functions.

A simple SSIS package can take millions of rows of data from foreign or native sources (non-Microsoft data source or Microsoft source) and change that data (ex. from currency values to string values) and place that data in any compliant location (ex. excel, oracle, mainframe, SQL, IBM DB2, access). SSIS can also perform very complicated data massaging, transforming and manipulation ([Appendix B: SSIS, ETL-data massaging...](#)). In this example, from Microsoft's tutorial, the package performs data cleansing, transformation and grouping. The end result is massaged and staged data; data not within the programmed filters or groupings is removed thus leaving only validated and desired data.

SSIS is a fully integrated component of SQL 2005. SSIS can create and manipulate: data cubes, automatically publish reports to the world wide web or SSRS, can work directly with Microsoft Office applications (i.e. Word, Excel, Access), provide automated data feeds, cleanse data, send e-mails and notify people of events. This is the power of Microsoft's integration software.

Further proving just how integrated these Microsoft tools are Sean McCown comments, "In fact, SSIS serves as a bridge between SSAS and SSRS and any ODBC-compliant data source." (1) SSIS' ability to communicate with so many sources makes it an invaluable tool BI functions.

SQL Server Analysis Services, SSAS

SSAS cubes allow fast access to cross sections of large amounts of data, millions of rows. For instance; sales data, in our example, can be sliced by time, people and product, ([Appendix E: Employee Hierarchy to Sales Dimensions](#)). Dimensions are an important aspect of SSAS cubes. Cubes are rows of data aggregated by a chosen fact across dimensions. Facts can be sales, phone calls taken, web site hits, tallies etc. Dimensions are what internally aggregate and cross section large amounts of data based on the selected fact ([Appendix D SSAS Data and Manager](#)). One of

the most important dimensions is time. Data is regularly rolled up throughout standard measures of time: fiscal years, annually, monthly, daily, weekly, and quarterly.

Aggregated dimensions, a SSAS cube, are what make it possible to query information in a quick amount of time, usually seconds. Imagine querying a vice president's sales organization's result over the last three years and he has 4000 employees in his organization with over one million sales transactions. This query in a relational, transactional database (not cubed) could take days to return results. In a rolled up SSAS cube this cross sectioned, aggregated data can be retrieved in seconds.

Examples of basic views of data, contained within a cube, are included in ([Appendix D: SSAS Manager and Data](#) and [Appendix E: Employee Hierarchy to Sales Dimensions](#)). Notice in [Appendix E](#) how the drill through of the sales staff goes left to right. As the hierarchy is drilled through (clicked to break out sales staff) the sales data/currency changes to reflect the current level of the business hierarchy. This simple view allows vice presidents to see rolled up sales numbers of all of his/her reports. In [Appendix E](#) and [Appendix A](#), a hierarchy dimension allows the user to see the rolled up sales of level four managers under the Senior Manager Collins, the hierarchy is broken down as follows: VP-Marshall, Senior Manager-Collins, Level 4 Managers-Burns and Slater (total sales for Level 4).

The importance of a cubing and analysis tool is imperative in analyzing large amounts of data with various slices/dimensions. Without cubing SQL server would require a purchase of a third party product but in SQL2005 Enterprise version SSAS is included at the cost. Most of these third party products are expensive and require skilled staff to implement and maintain thus, creating a large ongoing cost. Microsoft's inclusion of SSAS again confirms the company's commitment to business analytics, data integration and BI.

SQL Server Report Server, SSRS

Once the data has been collected, massaged, transformed and even cubed business users require reports; some way of viewing and analyzing the data. Accountants, senior management, managers, actuaries, marketing departments require graphical representation of the data. Microsoft includes a powerful reporting tool called SQL Server Report Server (SSRS). This development environment integrates with all components of SQL2005: SSIS, SSAS, SL2005 transactional database engine. SSRS publishes transactional data and cubed data to web based reports. SSRS produces both static and dynamic queries ([Appendix C: SSRS](#)). The development environment gives report designer the ability to develop graphics, tables and dynamic drop down list boxes ([Appendix C: SSRS](#)). Reports can be pre-developed by report designers or reports can be setup to allow end users to develop custom reports all through a simple web interface. SSRS shares a common data space with a scorecard application; they both are presentation layers. Once scorecards were the preferred method of displaying cubed analytical data, this is now changing at a drastic speed. SSRS is quickly becoming a preferred presentation interface for scorecard data. Although SSRS is a new software offering from Microsoft many vendors are embracing it as the front end into all aspects of SQL and Oracle databases.

The Scorecard

The scorecard application cited in this document is provided by Aim Technology and used by The Hartford Insurance Group. A scorecard is just as the title states, a report card of predefined business goals and measurements accessed through various views. Vendors primarily develop these applications in the web space; web servers such as Tomcat, Microsoft IIS, IBM Websphere. The components of a scorecard are KPIs (key performance indicators), which are rolled up results, contained within a SSAS cube ([Appendix D: SASS Manager and Cubed Data](#)). KPIs

culminate from many data elements rolled up through programming logic and dimensions, ([Appendix A: Scorecard](#)). An example of KPE logic within a SSIS package or scorecard cube would look like this: $KPE(\text{total phone adherence \%}) = ((\text{agent logged in phone available minutes}) - (\text{logged off phone minutes})) / \text{total working hours}$. This metric would rollup to the KPE phone attendance adherence metric as seen in the scorecard, ([Appendix A: Scorecard](#).)

Recently, many software vendors are changing direction from custom developed web based applications towards Microsoft's SSRS as the interface to scorecard information. Microsoft even included an undocumented scorecard plug-in. Scorecards allow the business community to analyze, investigate and manage to the predefined corporate goals ([Appendix A: Scorecard](#)). The scorecard is the culmination of these powerful, robust and flexible Microsoft BI tools and helps produce rapid deployments and easy management of the BI application space.

Conclusion

SQL 2005 will have a large affect across the business and technology industries. It may take a year or two but SQL 2005 will come to the technology forefront as the leader in business intelligence tools. The impact on the field will be apparent when Microsoft grabs the majority of the database and Business Intelligence markets. I believe Sean McCown captures the impact of Microsoft's SQL2005 release will have on businesses with one of his observations of SQL 2005 SSIS, McCown wrote, "SSIS will change the way your company thinks about its data. Systems that couldn't communicate before are now perfectly integrated." (2)

It takes a powerful software platform to achieve even a conjecture that software will change to way we think of and look at data; many businesses are solely built upon data. The object orientated development interfaces, rapid deployment, ease of on-going management and integration to just about any data platform make this release of Microsoft SQL 2005 ground breaking in the BI space and almost redefines the BI business space. What was once a

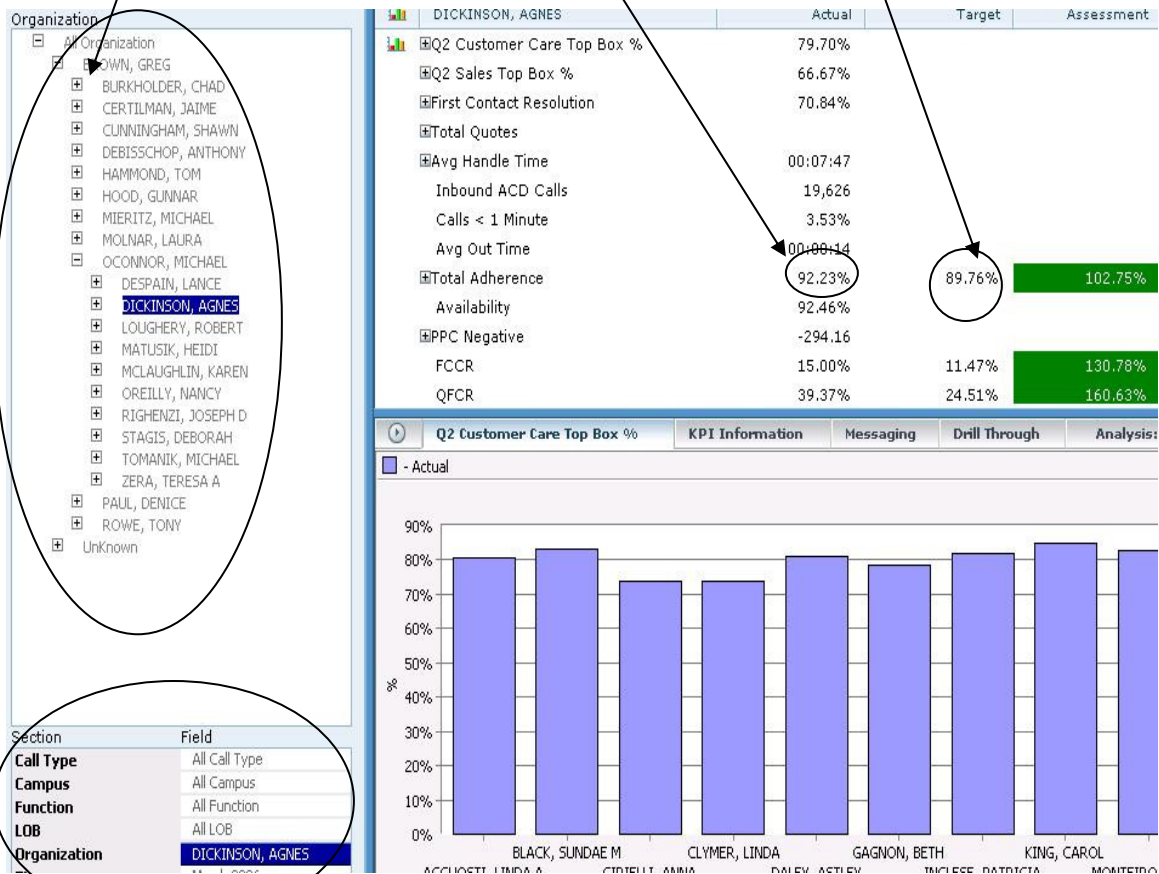
fragmented environment of many vendors' software packages is now a fully integrated and inexpensive solution to developing these application.

It is my estimation that the affects on the BI community won't be seen for at least six months but its impact will be felt by IT staffs, developers and business analysts long into the future. This software will send vendors like Oracle back to the research and development lab just to try and keep up with Microsoft's BI implementations.

Appendixes

Organization Hierarchy Dimension

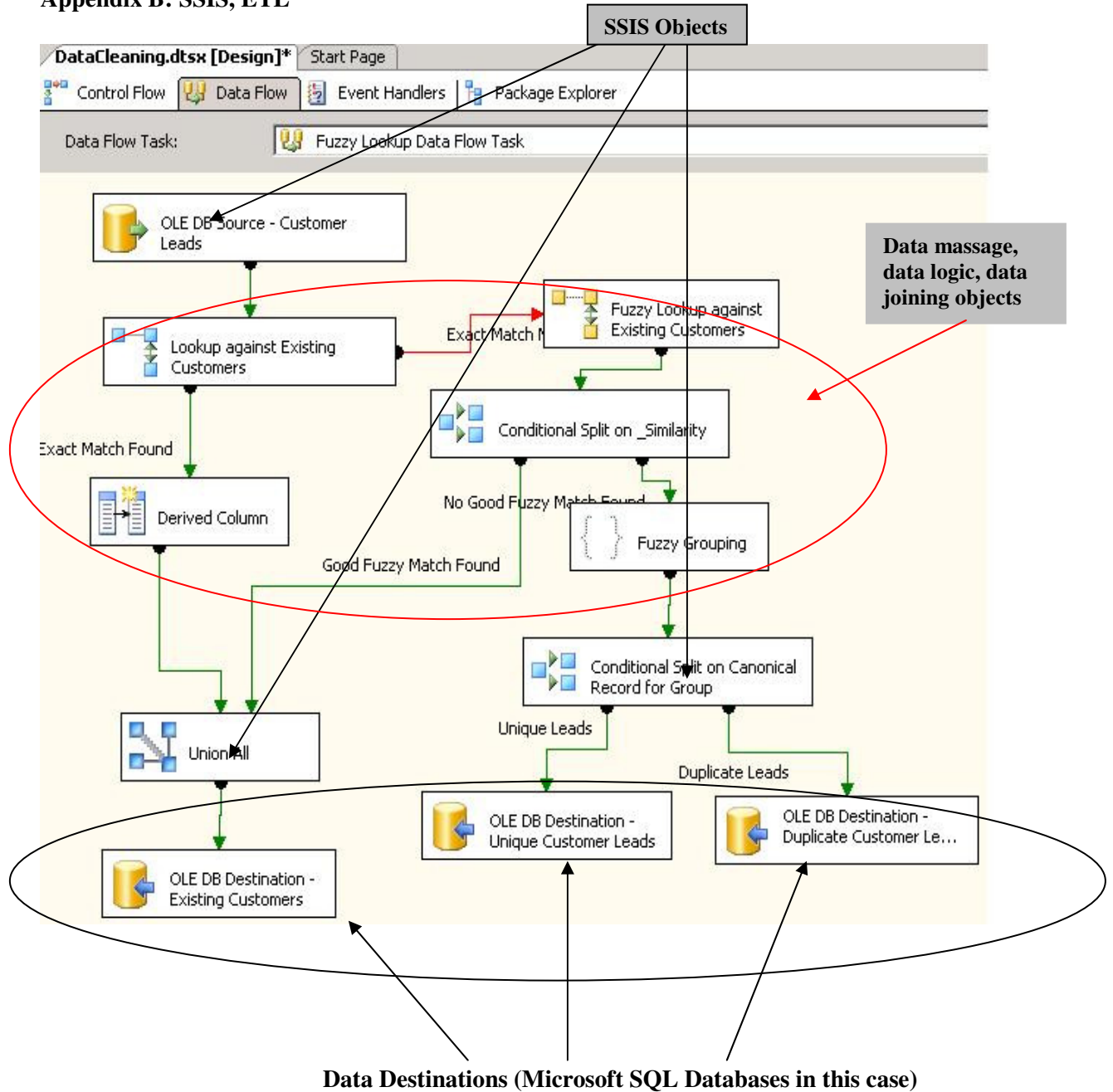
Appendix A: Scorecard



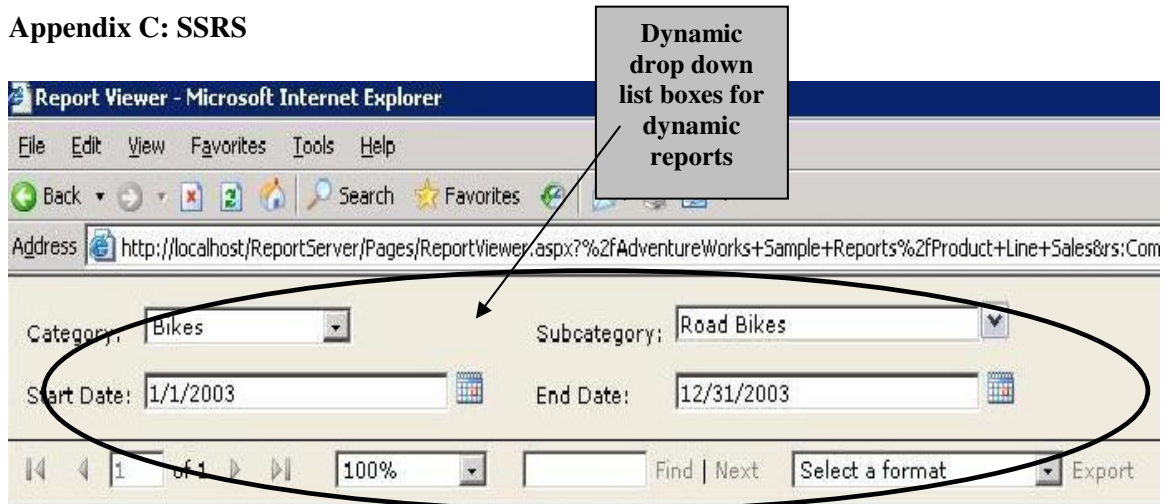
Graphic courtesy of The Hartford Insurance Groups' implementation of AIM Technologies AIM Call application

Dimensions

Appendix B: SSIS, ETL



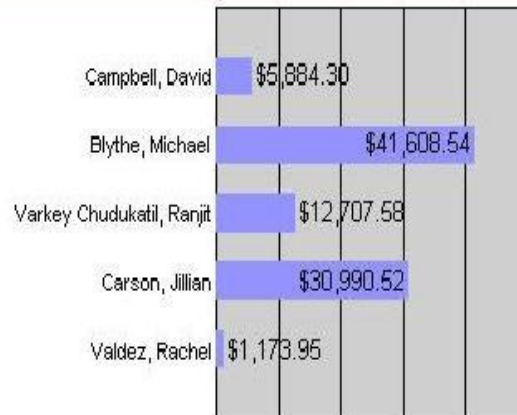
Appendix C: SSRS



1/1/2003 through 12/31/2003
Bikes (Road Bikes)

Top Employees

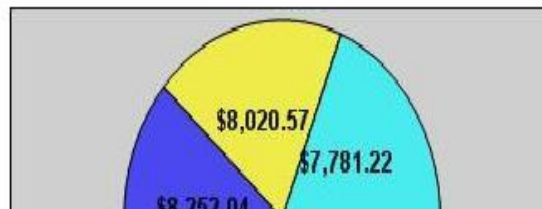
Employee Name	Sales
Valdez, Rachel	\$1,173,946.77
Carson, Jillian	\$30,990,517.95
Varkey Chudukatil, Ranjit	\$12,707,575.00
Blythe, Michael	\$41,608,538.68
Campbell, David	\$5,884,302.16



Sales (in thousands)

Top Stores

Store Name	Sales
Excellent Riding Supplies	\$8,564,441.53
Totes & Baskets Company	\$8,460,123.21
Comer Bicycle Supply	\$8,252,044.99



Appendix D: SSAS Manager and Cubed Data Sample

The screenshot displays the SSAS Manager interface. On the left, the 'Metadata' tree shows a hierarchy: Sales (Cube), Measures (Facts/Measures), and Product (Dimensions). The 'Measures' folder contains Freight, Order Quantity, Sales Amount, Sales Quota, Tax Amount, Unit Price, and Unit Price Discount Percent. The 'Product' folder contains Class, Color, Days To Manufacture, Dealer Price, Discontinued Flag, Finished Goods Flag, List Price, Make Flag, Product Category, Product Sub Category, Product SKU, and Weight.

The main pane shows a table with columns: Dimension, Hierarchy, Operator, and Filter Expression. The first row contains '<Select Dime...'. Below this is a table with columns: Product Category, Sales Amount, and Sales Quota. The data is as follows:

Product Category	Sales Amount	Sales Quota
Accessory	\$1,300,030	\$1,100,000
Bike	\$11,631,360	\$13,000,000
Clothing	\$1,000,110	\$2,000,000
Component	\$3,823,960	\$3,500,000
Service	\$401,280	\$300,000
Grand Total	\$18,156,740	\$19,900,000

Appendix E: Employee Hierarchy to Sales Dimensions

VP	Senior Manager	Level 4	Sales Amount	Sales Quota	
☐ Charles Marshall	☒	☒ Cody Baker	\$510,000	\$600,000	
		☒ Donna Bernard	\$1,050,000	\$1,100,000	
		☒ Ed Conley	\$740,110	\$800,000	
		☒ Eric Borges	\$1,140,450	\$1,500,000	
		☒ Jennifer Macaluso	\$1,100,000	\$1,200,000	
		☒ Kevin Collins	☒ Cheryl Brunner	\$1,326,780	\$1,600,000
			☒ Gary Staton	\$1,006,000	\$1,100,000
			Total *	\$2,332,780	\$2,700,000
		☒ Lois Wolter	\$1,200,000	\$1,200,000	
		☒ Mary Wyro	\$1,205,320	\$1,200,000	
		☒ Nathan Wyllie	\$1,210,500	\$1,200,000	
		☒ Paula Castillo	\$1,142,200	\$1,500,000	
		Total *	\$11,631,360	\$13,000,000	
Grand Total *		\$11,631,360	\$13,000,000		

Information Sources and Reference List

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2. McCown, Sean. SQL Server Bulks Up - Microsoft's beefy remake brings hefty new capabilities and a slew of new tools to master
http://weblog.infoworld.com/article/06/01/16/73517_03FEsql_1.html: January 16, 2006
3. Dumler, Michelle. Microsoft SQL 2005 Product Guide.
<http://www.microsoft.com/sql/prodinfo/overview/productguide.mspx>: September 2005
4. [Appendix A: Scorecard](#), courtesy of The Hartford Insurance Group's implementation of Aim Call Technologies scorecard application, AIM