SPECTECHULAR

EXPLORE

Business Intelligence for the .NET Developer

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Business Intelligence Is Not New

- The earliest known use of the term "Business Intelligence" is in Richard Millar Devens' in the 'Cyclopædia of Commercial and Business Anecdotes' from 1865
- Devens used the term to describe how a banker, Sir Henry Furnese, gained profit by receiving and acting upon information about his environment, prior to his competitors
- The ability to collect and react accordingly based on the information retrieved, an ability that Furnese excelled in, is today still at the very heart of BI

Business Intelligence Evolution

- Decision support systems (DSS) that began in the 1960s and developed throughout the mid-1980s.
- From DSS, data warehouses, Executive Information Systems, OLAP and business intelligence came into focus beginning in the late 80s
- Late 1990s that a Gartner analyst proposed "business intelligence" as an umbrella term to describe "concepts and methods to improve business decision making by using fact-based support systems.“
- Data Warehousing (Dimensional Modeling, ETL), Business Analytics (OLAP), and Semi/Unstructured Data (Hadoop/HDInsight)

Microsoft Business Intelligence Hamburger

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Microsoft's BI Product Suite

- SQL Server
  - Database Engine – OLTP/Data Warehouse
  - SQL Server Integration Service (SSIS) – ETL
  - SQL Server Analysis Services (SSAS) – OLAP
  - SQL Server Reporting Services (SSRS) – Reporting
- SharePoint
  - PerformancePoint – Dashboards/Scorecards
  - SSRS – Reporting
  - Power BI – Self-Service Reporting
  - BI Portal
- Office/Office 365
  - Power BI (Power View, Power Pivot, Power Map, Power Query)
  - Excel (Pivot Tables, Data Mining)
- SQL Server Appliances
  - Fast Track Data Warehouse (SMP)
  - Analytics Platform System (APS)
  - Massively Parallel Processing (MPP)
  - Parallel Data Warehouse (PDW)
  - Hadoop Region/HDInsight/PolyBase

What's in BI for .NET Developers

- SQL Server Integration Services (SSIS)
  - Custom Components
  - Script Components
  - Custom code to build packages (DTSX=XML)
- SQL Server Reporting Services (SSRS)
  - Custom Renderers
  - Custom Extensions
  - Custom code to build reports (RDL=XML)
- SQL Server Analytic Services (SSAS)
  - ADOMD.NET (data provider for OLAP)
  - Custom code to retrieve/update cubes (XMLA=XML)

SQL Server Integration Services (SSIS)

- A component of the Microsoft SQL Server database software that can be used to perform a broad range of data migration tasks
- Platform for data integration and workflow applications
- Features a fast and flexible data warehousing tool used for data extraction, transformation, and loading (ETL)
- May also be used to automate maintenance of SQL Server databases and updates to multidimensional cube data

SQL Server Integration Services (SSIS)

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SQL Server Integration Services (SSIS)

- Import/Export Wizard lets the user create packages that move data from a single data source to a destination with no transformations
- Developers tasked with creating or maintaining SSIS packages use a visual development tool based on Microsoft Visual Studio SQL Server Data Tools - Business Intelligence (SSDT-BI)
  - Build SQL Server relational databases, Azure SQL databases, Integration Services packages, Analysis Services data models, and Reporting Services reports
  - Design and deploy any SQL Server content type with the same ease as you would develop an application in Visual Studio

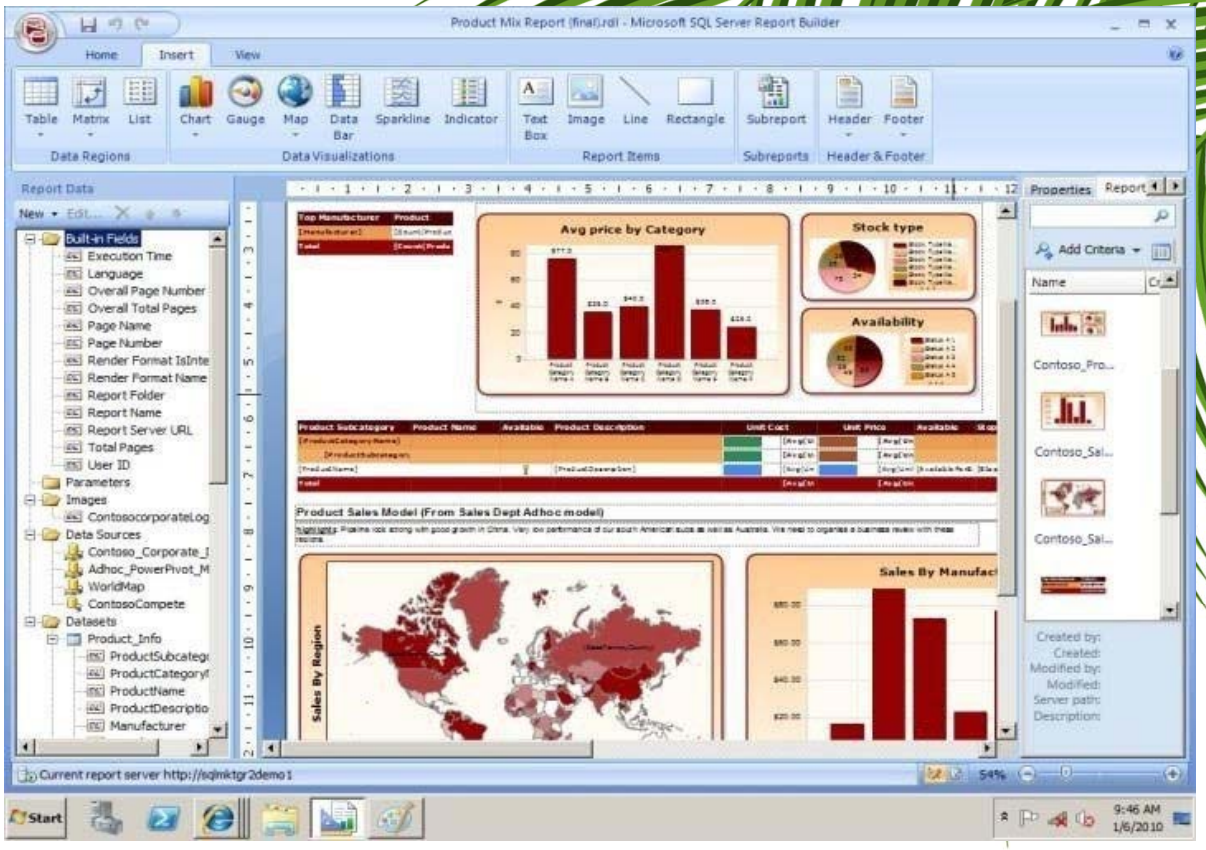
SQL Server Integration Services (SSIS)

- **Connections** - A connection includes the information necessary to connect to a particular data source. Tasks can reference the connection by its name, allowing the details of the connection to be changed or configured at run time.
- **Event handlers** - A workflow can be designed for a number of events in the different scopes where they might occur. In this way, tasks may be executed in response to happenings within the package — such as cleaning up after errors.
- **Parameters** - Parameters allow you to assign values to properties within packages at the time of package execution. You can have project parameters and package parameters. In general, if you are deploying a package using the package deployment model, you should use configurations instead of parameters.
- **Precedence constraints** - Tasks are linked by precedence constraints. The precedence constraint preceding a particular task must be met before that task executes. The run time supports executing tasks in parallel, if their precedence constraints so allow. Constraints may otherwise allow different paths of execution depending on the success or failure of other tasks. Together with the tasks, precedence constraints comprise the workflow of the package.
- **Tasks** - A task is an atomic work unit that performs some action. There are a couple of dozen tasks that ship in the box, ranging from the file system task (that can copy or move files) to the data transformation task. The data transformation task actually copies data; it implements the ETL features of the product
- **Variables** - Tasks may reference variables to store results, make decisions, or affect their configuration.

SQL Server Reporting Services (SSRS)

- Enables users to construct special databases for fast analysis of very large amounts of data
- Enables users to integrate data from many sources outside Microsoft SQL Server
- Enables users to quickly and easily generate reports from Microsoft SQL Server databases
- Interface into Microsoft Visual Studio so that developers as well as SQL administrators can connect to SQL databases and use SSRS tools to format SQL reports in many complex ways
- SSDT-BI reduces the Report Definition Language component to a drag-and-drop process for most aspects of the SSRS report

SQL Server Reporting Services (SSRS)



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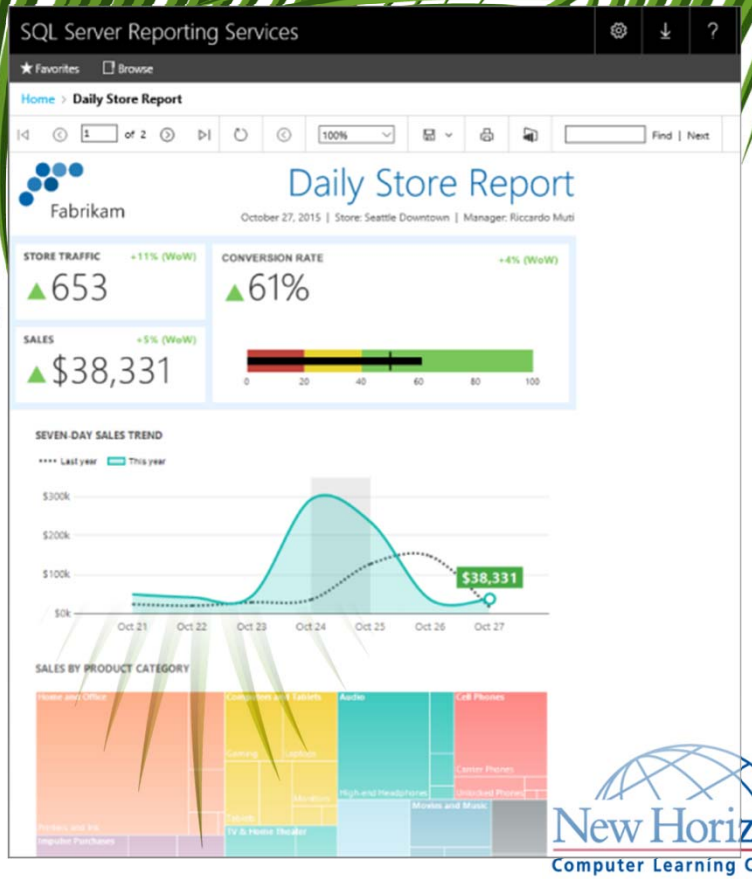
SQL Server Reporting Services (SSRS)

- Reports can be mobile, paginated, interactive, tabular, and graphical, with a variety of data, including relational, multidimensional, and XML-based data sources
- Reports can include rich data visualizations, including charts, maps, sparklines, and KPIs



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SQL Server Analytic Services (SSAS)

- Online analytical data engine used in decision support and business analytics
- Providing the analytical data for business reports and client applications such as Power BI, Excel, Reporting Services reports, and other data visualization tools
- Multidimensional and Data Mining Mode - Implement OLAP modeling constructs (cubes, dimensions, measures).
- Tabular Mode - Implement in-memory relational data modeling constructs (model, tables, columns).
- Power Pivot Mode - Implement Power Pivot and Excel data models in SharePoint (Power Pivot for SharePoint is a middle-tier data engine that loads, queries, and refreshes data models hosted in SharePoint).

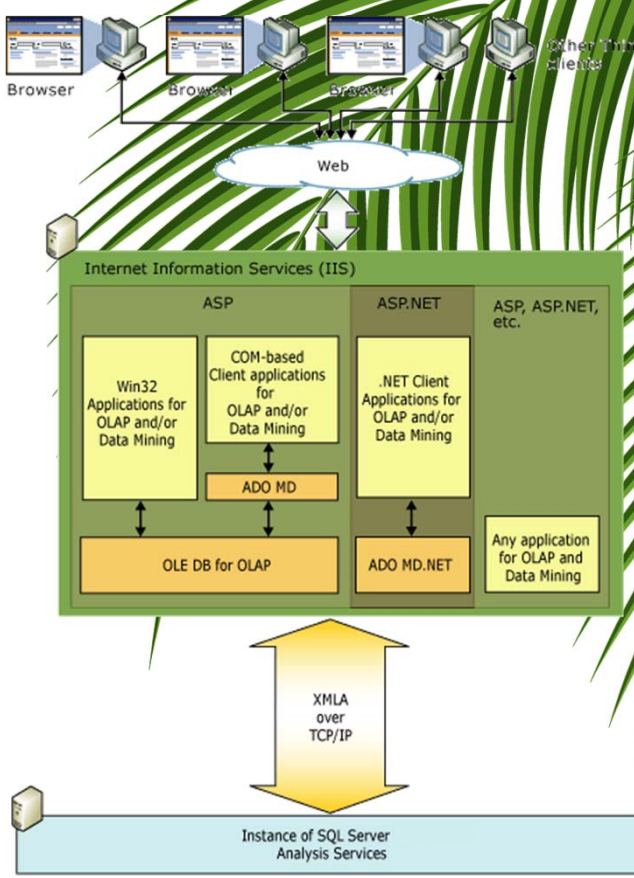
SQL Server Analytic Services (SSAS)

- Querying
  - XML for Analysis - The lowest level API. It can be used from any platform and in any language that supports HTTP and XML
  - OLE DB for OLAP - Extension of OLEDB. COM based and suitable for C/C++ programs on Windows platform.
  - ADOMD - Extension of ADO. COM Automation based and suitable for VB programs on Windows platform.
  - ADOMD.NET - Extension of ADO.NET. .NET based and suitable for managed code programs on CLR platforms.
  - ADO.NET Entity Framework - Entity Framework and LINQ can be used on top of ADOMD.NET (SSAS Entity Framework Provider is required)
- Administration and management
  - DSO - For AS 2000. COM Automation based and suitable for VB programs on Windows platform.
  - AMO - For AS 2005 and later versions. .NET based and suitable for managed code programs on CLR platforms.

SQL Server Analytic Services (SSAS)

- ADOMD.NET is a Microsoft .NET Framework data provider that is designed to communicate with Microsoft SQL Server Analysis Services
  - Uses the XML for Analysis protocol to communicate with analytical data sources by using either TCP/IP or HTTP connections to transmit and receive SOAP requests and responses that are compliant with the XML for Analysis specification
  - Commands can be sent in Multidimensional Expressions (MDX), Data Mining Extensions (DMX), Analysis Services Scripting Language (ASSL), or even a limited syntax of SQL, and may not return a result
  - Analytical data, key performance indicators (KPIs), and mining models can be queried and manipulated by using the ADOMD.NET object model
- View and work with metadata either by retrieving OLE DB-compliant schema rowsets or by using the ADOMD.NET object model.

SQL Server Analytic Services (SSAS)



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Top 10 BI Trends for 2016

1. Governance & Self-service Analytics Become Best Friends
2. Visual Analytics Becomes A Common Language
3. The Data Product Chain Becomes Democratized
4. Data Integration Gets Exciting
5. Advanced Analytics Is No Longer Just For Analysts
6. Cloud Data & Cloud Analytics Take Off
7. The Analytics Center Of Excellence (COE) Becomes Excellent
8. Mobile Analytics Stands On Its Own
9. People Begin To Dig Into IOT Data
10. New Technologies Rise To Fill The Gaps

Summary

- Microsoft has introduced a huge push toward business intelligence, focusing heavily on the area of self service
- It has provided users with tools that allow them to run reports and perform BI actions as needed at any time, without the need for IT's intervention
- The amount of data that businesses accumulate will continue to grow
- Businesses must continue to increase their capacity to discover useful data which will likely come from various systems and will require planning and collaboration to utilize effectively

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