Sheridan | Get Creative

Advanced .NET Server Development: Reports

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Objectives

- Intro to Reporting
- Capstone Reports
- Intro to SQL Server Reporting Services (SSRS)
- Report Manager
- Intro to Report Authoring
- Building Reports

Introduction to Reporting

- Reporting is about
  - analyzing large sets of data, transforming the data and presenting it to the user
    - in a way that facilitates business decisions
- Reporting is a major part of what is now commonly referred to as "Business Intelligence"
- Reporting is very important for businesses as it allows:
  - Understand the current state of the business (customers, sales, products, inventory, suppliers, purchases, financials, etc.)
  - Identify trends in business
- Reporting is very important for Capstone Projects.

Reports versus Data Dumps

- A standard Order List that lists every sale in the Orders table is NOT a Report. This is a Data Dump!
  - Would you want to manually analyze every order on Amazon for the past month to assess how the business is doing?
  - How about reviewing each entry of the Toronto phone book and manually collecting statistics?

Capstone Reports

- Reports in Capstone projects have been problematic in past Capstones for the following reasons:
  - Students struggling to identify which management reports will deliver the most value and help to facilitate business decisions
  - Students lacking the skills in the appropriate tools (ex. SSRS) to make powerful and visually appealing reports
- In Capstone, the emphasis is on "Management Reports" which are typically Summary or Exception Reports (SAD Course) and NOT Detail Reports
- When designing your Capstone "Management Reports" ask yourself the following:
  - What would I want to know/track to better manage my business?
  - How can my reports deliver the most value to my customers?

Capstone Reports

- Focus on Summary and Exception Reports which facilitate Business Decisions (ex. sales totals grouped by category)
- Avoid Detail Reports especially when they are basically Data Dumps (ex. list of all sales)
- Output Forms (Invoices, Purchase Orders, etc.) do NOT assist with decision making so they do NOT qualify
- You will be required to build a prototype of Management Report for Capstone in this class!

Layout of Capstone Reports

- Remember to include a report header and footer with:
  - Branding (Customer Logo and Company Name)
  - A Clear Title
  - The Date it was generated on
  - The Filter Conditions that were used to generate the report
- Reports should also provide Pagination Support meaning every page should have:
  - Page number (ex. 3 of 5)
  - Column/Field Headers
  - Basic header information (title, date generated, etc.)

Introduction to SQL Server Reporting

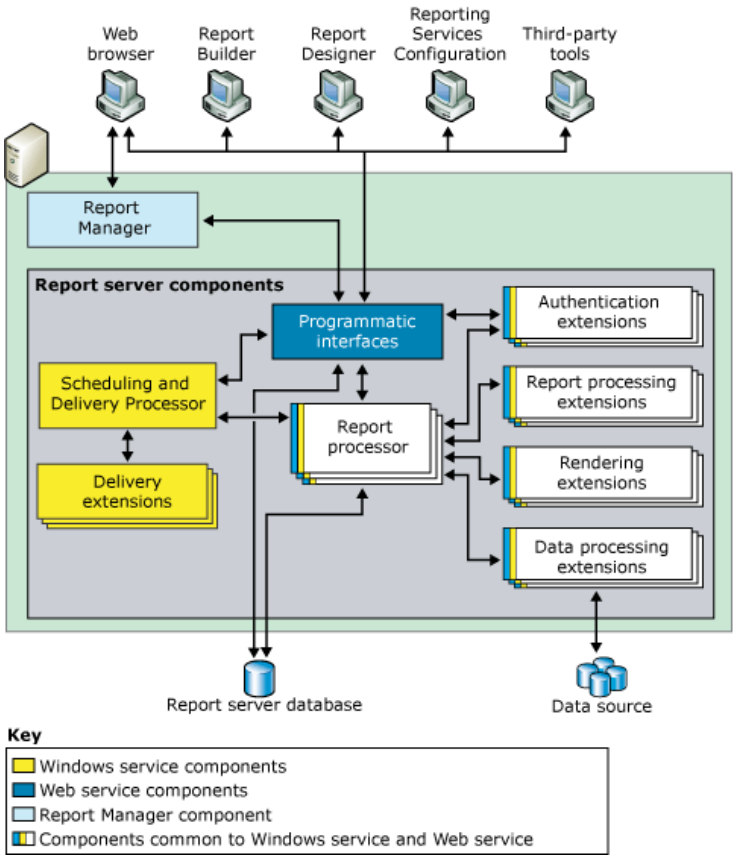
- There are several tools for SQL Server Reporting
- The two most common are:
  - Crystal Reports
  - SQL Server Reporting Services (SSRS)
- Crystal Reports
  - was very popular for SQL Server Reporting for many years
  - was included for free with Visual Studio for many years up until VS 2010
- Microsoft has invested heavily in SQL Server Reporting Services (SSRS) recently and it has become the most popular Reporting option for SQL Server

Introduction to SQL Server Reporting

- SSRS is a component of SQL Server
  - which may be installed on the same machine as SQL Server
- A powerful but limited version of SSRS is included with
  - SQL Server Standard, Web and "Express with Advanced Services" 2012 editions
- The full version of SSRS is included with
  - Enterprise and Business Intelligence editions of SQL Server 2012
- SSRS is typically sold as an add-on for Web hosting packages OR as part of a more expensive hosting package.

Introduction to SSRS

- Web Browser for retrieving reports
- Report Manager provides a web portal for accessing and managing reports
- Report Builder and Report Designer are used for designing reports
- Report Server to generate reports
- Web Service for programmatic access to reports
- Data Source (SQL Server, Oracle, etc.) for the data



Microsoft (n.d.). Reporting Services Report Server (SSRS). Retrieved August 10, 2013, from http://msdn.microsoft.com/en-us/library/ms157231.aspx

Video

- Let's watch a great video (1.2) from the "SQL Server Reporting Services in Depth" series on Lynda

Report Manager

- Report Manager is accessible through a Web Browser and is used for:
  - Managing and running reports
  - Subscribing, scheduling and printing reports
  - Managing security
  - Much more…
- To access report manger:
  - Using IE enter the URL you set for the Report Manager during the installation
  - The format of the Report Manager URL is normally http://server/Reports_SQLExpress
  - Use Reporting Services Configuration Manager for troubleshooting.

Report Authoring

- There are at least 3 ways of designing SSRS Reports:
  - Report Builder 3.0 is a separate tool which is downloadable for free from Microsoft. Its interface is similar to Microsoft Office Applications
  - SQL Server Data Tools (SSDT) which replaced Business Intelligence Development Studio (BIDS) for SQL Server 2012.
  - Report Designer in Visual Studio which is similar to using the Visual Studio Designer for Windows Forms or Web Forms. Note however that:
    - It does not provide Preview support
    - It saves files in RDLC format instead of RDL which the other tools use. Note that the C stands for client and the RDLC files do NOT embed information about the data source.

Report Authoring

- We will be using Report Builder since:
  - It is generally considered easier to use (for non technical staff)
  - There is a great set of videos available for it on Lynda
  - It has full preview support and integrates nicely with Report Manager
  - This is what your pointy haired bosses will most likely be using!
  - DB Admins are likely to either use Report Builder or SSDT

Building a Report

- To build a report:
  - Define the Data Source (server & database) of the underlying database.
  - Define the Dataset of interest (tables, fields, etc.) from the Data Source
  - Design the layout of the report
  - Save the report to the Report Server (http://localhost/ReportServer_SQLEXPRESS)

Running a Report

- To run a report:
  - Open IE to the Report Server's Home Page (Report Server Manager) (http://localhost/Reports)
  - Left click on the Report of interest
- Note: you can also run the report directly from Report Builder by clicking the Run button in the Home tab.

Visual Presentation of Data

- The SSRS Report Builders provide a wide variety of visual controls for presenting data
- The two major categories are:
  - Data Regions (Tablix) – tabular / numeric display
  - Data Visualizations – graphical display
- To format a cell in a Tablix:
  - Select the cell
  - Change to the Home tab and change the Category dropdown (ex. Currency)
  - From the Properties Window change the required parameters
- To add/edit an expression for a cell in a Tablix:
  - Right click the cell of interest
  - Select "Expression…" from the dropdown list
  - From the Expression Window add/modify the expression as required
- Note that Data controls can be nested (Nested Regions) which allows us to place controls inside controls

Tables, Lists and Grouping

ADN Co. - Sales By Country

Table with No Grouping

Country	Month	Sales
USA	Jan	10000
USA	Feb	20000
Canada	Jan	100
Canada	Feb	200
Mexico	Jan	1000
Mexico	Feb	2000

Table (Grouped by Country)

Country	Month	Sales
⊟ Canada	Jan	100
	Feb	200
		300
⊞ Mexico		3000
⊞ USA		30000
Total		33300

Tables (Grouped by Country and Month)

Country	Feb	Jan	Total
Canada	200	100	300
Mexico	2000	1000	3000
USA	20000	10000	30000
Total	22200	11100	33300

List (Grouped by Country)

Canada	300
Mexico	3000
USA	30000

Which Tablix provides the most information?

The Matrix

- The Matrix Tablix allows
  - to group by rows and columns
  - to expand and collapse groups of columns and rows
  - to provide more or less detail as required
- Supports a variable number of columns
- Similar to Pivot Tables in Excel

		⊞ Accessories		⊟ Digital						Total	
		Total		Compact Digital		Slim Digital		Total			
Territory	**Sales Date**	**Sales**	**Quantity**	**Sales**	**Quantity**	**Sales**	**Quantity**	**Sales**	**Quantity**	**Sales**	**Quantity**
⊟ Central	1/5/2009 12:00:00 AM	19494.1000	103	10191.0000	79	7218.1000	38	17409.1000	117	36903.2000	220
	1/6/2009 12:00:00 AM	15584.8000	83	3870.0000	30	9877.4000	52	13747.4000	82	29332.2000	165
	Total	35078.9000	186	14061.0000	109	17095.5000	90	31156.5000	199	66235.4000	385
⊞ North	Total	30919.8500	174	14577.0000	113	20894.5000	110	35471.5000	223	66391.3500	397
⊞ South	Total	24678.6000	151	19221.0000	149	15955.8000	84	35176.8000	233	59855.4000	384
Total		90677.3500	511	47859.0000	371	53945.8000	284	101804.8000	655	192482.1500	1166

Pagination Support

- To enable the Column Headers on each page for a table:
  - From the Column Groups dropdown enable "Advanced Mode"
  - From Row Groups, select the top "Static" row
  - From the Properties Window, set the "RepeatOnNewPage" property to True
- To enable headers and footers on each page of a report:
  - From the "Insert" Tab, select "Header"->"Add Header"
  - Customize this header with Text Boxes and Images as necessary
  - Customize the footer to include page numbers and other necessary information
- To do a "Print Preview"
  - Click the "Print Layout" button in the Run Ribbon.

Report Parameters

- What if we can not predict what exact subset of data the user is interested in? For example
  - perhaps the user is interested in sales over the last year, year to data, last quarter, last month or last week.
  - Perhaps the user is interested in these sales for a specific store, province or country.
  - Perhaps the user is interested only in products of a certain category.
- Report parameters allow to dynamically change the WHERE clause based on the user's requirements.
  - Helps in avoiding having to create multiple similar reports
  - Provide lots of flexibility for users.

Report Parameters

- To add a report parameter:
  - Add an embedded Dataset
  - Using the wizard:
    - Select the "embedded" dataset option and an existing Data Source
    - Click the "Query Designer" button
  - From Query Designer:
    - Select the desired fields from the "Database view" panel
    - Click the "Add Filter" button
    - Customize the filter in the "Applied filters" panel as required
    - Select the "Parameter" checkbox
    - Verify that the new Parameter has been added to the Parameters node of the Report Data Window.
    - Double click on the newly added Parameter in the Report Data Window to customize its properties

Report Parameters & Pagination

- By default Parameters are NOT included in the printed reports built with Report Builder
- To include the Parameters in the Printed Version:
  - Add a TextBox to the Report
  - Define an expression in the TextBox to display the parameters such as:
    - ="Filters Applied -> Minimum List Price: $" & Parameters!ListPrice.Value & "; Sell Start Date: " & Parameters!SellStartDate.Value

Values for Report Parameters

- Sometimes it is useful for the user to populate a list of possible parameter values from another Dataset
- To populate a report parameter from another Dataset after completing the steps in the previous slide:
  - Add another embedded Dataset with the data to be used
  - From the "Report Parameter Properties" window:
    - Select "Available Values" and "Get values from a query"
    - Select the new Dataset
    - Set the "Value" field to the field the parameter requires
    - Set the "Label field" to the value you want the user to see
    - Click the "OK" button
  - Run the report and click the "View Report" button after changing the filter

Report Sorting

- Users will often want to sort the data in reports based on one or more criteria (amount, last name, etc.)
- We can easily provide support for automatic sorting in all of our reports as follows:
  - Select the Tablix of interest
  - From the Properties Window, click the "Property Pages" icon
  - Select the "Sorting" group
  - Configure the sorting as necessary
- We can easily provide support for interactive sorting in all of our reports as follows:
  - Select the cell/Textbox of interest (not just the text)
  - From the Properties Window, click the "Property Pages" icon
  - Select the "Interactive Sorting" group
  - Configure the sorting as necessary

Conditional Formatting

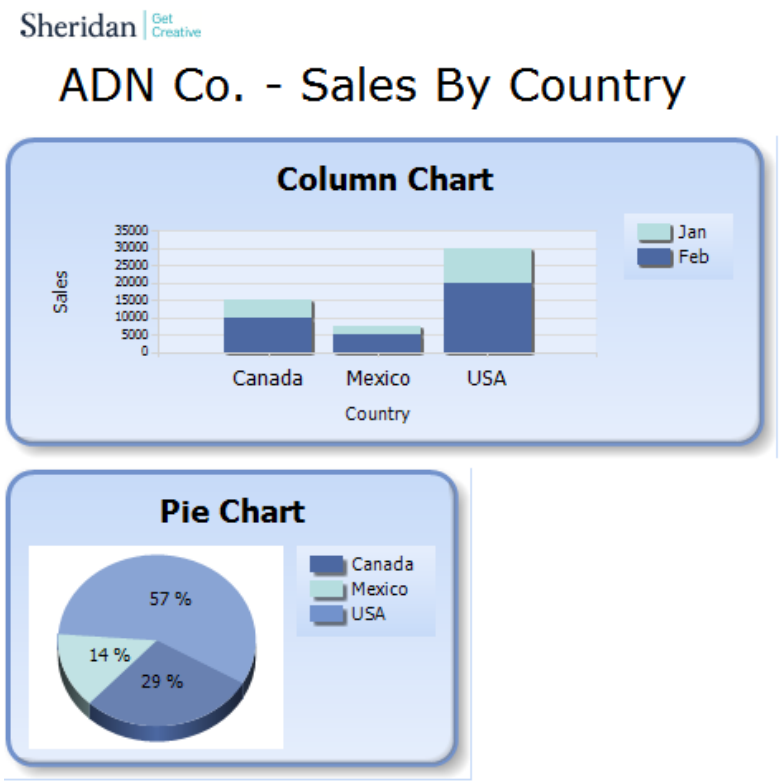
- We can also use Conditional Formatting to change the font of a field based on an expression as follows:
  - Select the cell/Textbox of interest (not just the text)
  - From the Properties Window, click the "Property Pages" icon
  - Select the "Font" group
  - Configure the font as necessary using the "fx" buttons

Report Actions

- Drilldown actions allows the user to expand/collapse details of a report by clicking the +/- group icon
- Drillthrough actions open a separate report when the user clicks a link
- To add an action to a cell:
  - Select the cell/Textbox of interest (not just the text)
  - From the Properties Window, select the "Action" entry and click the Ellipsis button
  - Ensure that the "Action" group is selected
  - Configure the Action as necessary using the "Change action options" window
  - Optionally, select the text of interest and change the font color to blue and underline it to make it look like a hyperlink

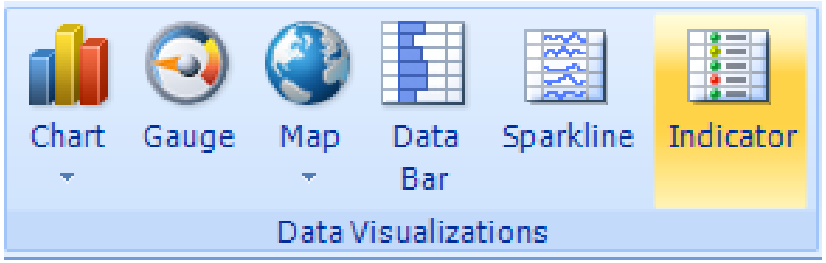
Data Visualizations - Charts

- There are a wide variety of graphical components that can be added to reports including:
  - Bar Charts, Column Charts, Pie Charts, Maps, Sparklines, Indicators, Guages, etc.
- Each of these components can be customized in many ways
- These graphical components are often easier to interpret than plain tabular data
- In many cases a combination of Graphical and Tabular components is most effective in a Report



More Data Visualizations

- Data Bars:
  - normally used in tables to provide a single bar to provide a graphical measure of the magnitude of a single value (ex. sales last month)
- Indicators
  - simple icons normally used in tables to indicate the status or trend of a particular value (sales trends, market share, etc.)
- Gauges
  - often used to provide a visual indication of the magnitude of a single value such as a Key Performance Indicator (KPI). Commonly used inside of tables (ex. production capacity utilization)
- Sparklines
  - normally used in tables to provide a small plot of the history/trend of a particular value (ex. stock price, sales history, etc.)
- Maps
  - used to provide visual geographic background and context to data (ex. sales by province)



Video

- Let's watch a great video (3.1) from the "SQL Server Reporting Services in Depth" series on Lynda

Reusing Report Elements

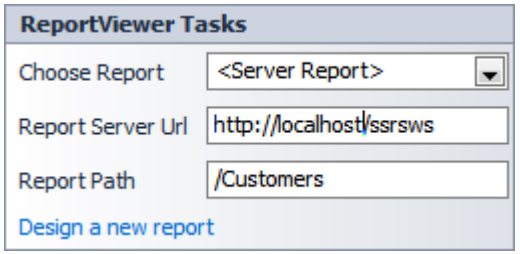
- There are a few ways to reuse portions of reports including:
  - Sharing Data Sources and Datasets
  - Report Parts (reusable report elements)
  - Linked Reports (reuse an existing report but change a default parameter ex. USA to Canada)
  - Subreports (reports in reports)

Programmatically Viewing Reports

- There are a few different ways to programmatically generate an existing report including:
  - Using the Report Viewer control in Windows Forms or Web Forms
  - Building a URL with parameter data (similar to Query Strings) to pass values to the Report Server (cross platform)
  - Using the Report Server's Web Services (involves more work to display the data)
  - Using the WebBrowser Control in Windows Forms

Report Viewer Control (Web Forms)

- Supports generating the report locally or on the Server
- To configure for Server Report, using the Visual Studio Designer:
  - Create a new Web Form in an ASP Project
  - Drop a ReportViewer control onto the Web Form
  - Drop a ScriptManager control onto the Web Form
  - Using the SmartTasks from ReportViewer Control set:
    - "Choose Report" property to "<Server Report>"
    - "Report Server Url" property to the URL of your report server (ex. http://localhost/ReportServer). NOTE: This is NOT the same URL that Report Manager uses but is the URL that shows up in the Status bar of Report Builder
    - "Report Path" property to the path of your report preceded by a "/" (ex. /SalesByCountry)



Report Viewer Control (Web Forms)

- ReportViewer can be used in Local mode which is handy if SSRS is not available
- However, you must migrate Report Builder's RDL Reports so that they can be used in Local mode
- Reports designed using Visual Studio are more easily used in Local Mode. This along with version control integration are the main advantages of using Visual Studio for Report Authoring
- Note ReportViewer can be tricky to configure if IIS is running on one machine and SSRS is running on a different remote machine on a different domain.
- ReportViewer is easy to use when:
  - In Server Mode when IIS and SSRS are installed on the same system
  - In Local Mode when IIS and SQL Server are installed on the same system (ex. web host) with Full Trust

Video

- Let's watch a great video about the ReportViewer Control on Channel 9