

Chapter 2

Gauges in SQL Server Reporting Services 2008

In This Chapter

- ▶ **Determining the Appropriate Gauge for the Type of Data Being Displayed**
- ▶ **Report Creation Tools in SQL Server 2008**
- ▶ **Creating the Bullet Graph Gauge**
- ▶ **Linear Gauge Varieties**
- ▶ **Radial Gauge Details**
- ▶ **Interesting Component Behaviors**
- ▶ **The Gauge Panel and Multiple Gauge Items**
- ▶ **Using Gauges in Reports and Dashboards**
- ▶ **Wrap-Up**



This chapter shows how to create gauge reports using SQL Server Reporting Services (SSRS) to achieve greater information insight and absorption. Data visualizations are becoming more important as the amount and complexity of data increase. Gauges have the ability to display data compared to a metric in order to clarify data values. There are many components to a gauge, including its scale, ranges, and graphic composition. A gauge graphic representation is perceived differently than a chart. The goal of this chapter is to present the wide range of possibilities for using gauges appropriately in report and dashboard displays, and to show the techniques for configuring the gauges to get the best possible representation of the data.



BITIP

Gauges imply boundaries—the data must fall within certain bounds in order to be displayed on the gauge scale. The maximum and minimum scale values are easy to see on a gauge. Also, the value displayed on a gauge is easily perceived as a measure of progress by the human eye.

For example, time series data just isn't displayed well using a gauge; a line or area chart is much more effective for representing this type of data, as shown in Figure 2-1. Charts highlight trends, patterns, and exceptions in the data, and time series analysis is critically concerned with these situations.

Gauges, on the other hand, display one point-in-time measurement as compared to a target, a previous value, or both, with perhaps some qualitative reference (like red/amber/green) to help give context. Most of us are familiar with gauge displays from our automobiles, especially the radiator red zone or the gas gauge red zone, and the reaction to this information that has been programmed into us: Respond, take action. Get coolant, get gas. We can use this instinctual reaction to help us use gauges as effective communicators of critical information to decision makers. So when designing a new dashboard, ask the stakeholder, what information is it that causes you to act? How do you know when it's good or bad? What are the boundaries for that measurement? How do you want to be informed when the gauge is in the red zone—color, alert notification, flashing indicator, sound?

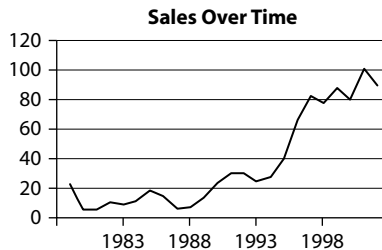


Figure 2-1 Series data displayed in a line chart

As you begin to put the storyboard together, consider the types of charts and gauges to use to best convey all the necessary information needed for decision making and action. Many business intelligence authorities discount gauges because they take more space than a simple indicator, but combined with other dashboard elements like charts and numerical grids, gauges can be used to effectively convey important measurement information. We will explore these topics in order to fully examine how gauges can be created in Reporting Services:

- ▶ Determining the appropriate gauge for the data
- ▶ Creating the gauge graphics and setting gauge properties
- ▶ Properties of radial and linear gauges
- ▶ Special uses for gauges—displaying metrics, KPIs, and target values
- ▶ Combining gauges with charts and other report elements for maximum impact



BEST REFERENCE

For further research on SQL Server Reporting Services, go to <http://msdn.microsoft.com/en-us/sqlserver/cc511478.aspx>.

To download the AdventureWorks sample database, cube, and reports, visit CodePlex at <http://msftdbprodsamples.codeplex.com/>.

For examples of different gauge visualizations, visit Dundas at www.dundas.com/Gallery/Flash/Gauge/.

Determining the Appropriate Gauge for the Type of Data Being Displayed

The gauge is a visual data representation that displays a single value. The objective of using gauges for reporting is to make the metric values obvious. Gauges are good visualizations for key performance indicators (KPIs) and metrics (calculated measures) because gauges can show data points compared to a goal or target value. Presenting comparison values is an important part of giving the gauge meaning. Use gauges to display business intelligence and performance management information, like KPIs on dashboards and in scorecards. You can also place a gauge within a report table or matrix to illustrate data values and complement textual descriptions. We will show an example of that at the end of this chapter.

**BI TIP**

Here are rules of thumb for determining which type of gauge to use, radial or linear, for an information display:

- ▶ *Consider the amount and shape of the space available in the report or on the dashboard to display the gauge. If you are displaying gauges on a dashboard, space constraints may dictate which type will fit better into the overall display.*
- ▶ *Determine the amount of visual appeal necessary to convey the appropriate information impact. Some gauges are more eye attracting; use shapes, impact colors, and expressions to vary properties.*
- ▶ *Ensure you meet audience expectations. If a report audience has become accustomed to seeing particular metrics displayed in a radial gauge, they may have a hard time adjusting to a change in that display style. Determine the ground rules, develop a consistent pattern, and educate your audience about what they are seeing. Generous use of labels and contextual information will help them absorb the meaning behind the numbers.*
- ▶ *Generous use of labels and contextual information will help the report audience absorb the meaning behind the numbers.*

Think about a car dashboard—the speedometer is probably displayed as a radial gauge or meter, and the temperature gauge may be displayed as a horizontal linear gauge. Although some visualization professionals have little use for the gauge type of display, we can think of one application where they are entirely appropriate: the Operational Business Intelligence Dashboard. We will show some examples of this later in this chapter.

Displaying gauges is very flexible, and you have many options for connections between gauges. In SSRS Report Designer or Report Builder gauges are like charts; you can have multiple gauges inside a gauge panel just as you can have multiple charts within a chart container. The multiple gauges within one gauge panel can display comparisons between fields in your dataset.

Reporting Services has many gauge choices, and each one has options galore! They are broken into two major groups, Radial and Linear. The following tables display each of the Radial and Linear gauge styles for reference. Radial gauges have four general types:

360° (Full Circle), also known as full round: This gauge type has the maximum sweep range available.



Full Circle with Mini-Gauge: Use this style to display a secondary metric along with the initial measure. Make sure to place the mini-gauge where it can be seen!



180° (Half Circle, North and South): This is a familiar representation, and quite adaptable for dashboards.



90° (Quarter Circle, Northeast, Northwest, Southeast, Southwest): This radial gauge type has the smallest sweep range and display area.



Meter: The meter is like the horizontal linear gauge but supports using a needle pointer.



The number of degrees indicates how large the sweep range is on the gauge; for example, a 90° gauge displays a quarter pie shape with a sweep range of 90°.

Linear gauges can have vertical or horizontal scales; the choices for linear include:

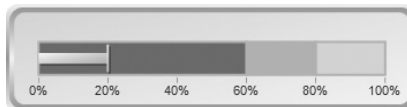
Single Range (horizontal or vertical): These linear gauges are the most commonly used and support multiple scales, pointers, and ranges.



Logarithmic: This is similar to the horizontal linear gauge, with a specialized scale for logarithmic values.



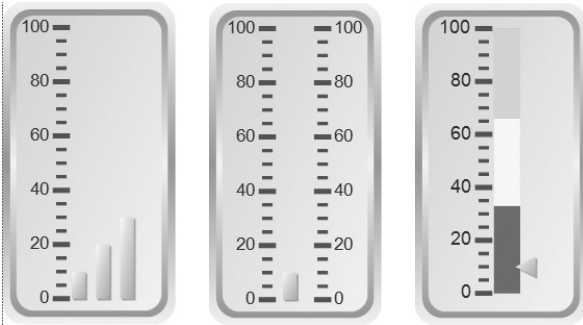
Bullet Graph: This is the most appealing and understandable linear gauge choice. It is used in an example under “Creating the Bullet Graph Gauge” later in this chapter.



Multiple Bar Pointers: This choice allows the display of multiple measurements for easy comparison.

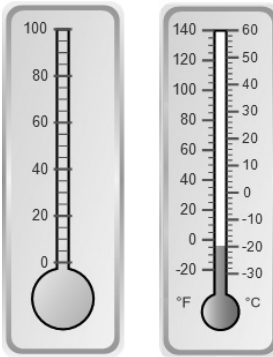
Two Scales: Compare the metric value against two scales; one may be a percentage.

Multiple Color Ranges: Ranges are available on all gauges; this one is preformatted for ease of use.



Thermometer: Traditional display with bulb or flask end.

Thermometer with Two Scales (Fahrenheit/Celsius): This type has the two scales preconfigured for ease of use.



Report Creation Tools in SQL Server 2008

SQL Server Reporting Services (SSRS) is a mature product with several report creation tools. Two report design tools are included with SSRS 2008: Report Designer is for the software developer; Report Builder is for the savvy end user.

- ▶ **Report Designer** is a component of Business Intelligence Development Studio (BIDS) and uses the Visual Studio shell. BIDS is created for the professional report developer or power user, who has a good understanding of database access, query creation, and report formatting.
- ▶ **Report Builder** is a vastly improved report creation tool that has a more “Office-like” interface, utilizing the menu ribbon metaphor. Report Builder can use report models, which predefine the data connection strings, database, tables, and relationships available to the report author; or embedded or shared data sources. This greatly simplifies the report creation experience and gives flexibility over the dataset one can create.

Fortunately, the graphic elements discussed here are available in both report design tools! In this chapter we use both Report Designer and Report Builder so that the differences in the user interface can be explored.

The choice between using Report Designer and Report Builder 3.0 is getting tougher. Here are some considerations:

BIDS requires an application installation from SQL Server Client Tools. It has a sophisticated display and many options.	Report Builder 3.0 is a click-once run application that downloads from Report Manager. It has a clean, well-organized display with few options.
BIDS allows the creation of multiple reports in one project/solution file.	Report Builder 3.0 works on one report at a time.
BIDS supports complex queries, multiple data sources, report parameters, and filters.	Report Builder 3.0 also supports complex queries, multiple data sources, report parameters, and filters.
BIDS also has other project types that can link into Team Foundation Server, Visual Source Safe, and other development tools.	Report Builder 3.0 is a stand-alone application that doesn't connect to any other development tools or infrastructure.
BIDS was designed for developers.	Report Builder 3.0 was designed for savvy end users.
BIDS can be used to construct specialized report models.	Report Builder 3.0 cannot be used to create report models. They can be used only as data sources.

Report Builder 3.0 is part of the upcoming technical refresh for SQL Server 2008 R2. It is a vast improvement over previous versions of Report Builder, and we may just switch our allegiance from Report Designer as the tool of choice!



BI TIP

If you like Report Builder 3.0, you already have a report model for a data source, and your report doesn't need version control (outside of SharePoint) or integration with other reports, then use it! You will quickly come to appreciate the features and functionality of this vastly improved application.

Now that you have a basic understanding of what styles of gauges are available, and the report creation tools available through SQL Server 2008, we can get started.

Creating an SSRS Report Designer Report

Let's get started on the journey by creating some new reports! There are several steps that must be completed before you actually get to add the gauge to the report. Hang with us as we prepare for creating reports by choosing our design tool and getting the

Visual Studio solution file created. To get started with Report Designer, you need to know that there are two options when creating a new report project:

- ▶ **Report Server Project Wizard** Presents dialog boxes and prompts you through creating the report in a logical way by first defining the data source, then designing the query, and then placing you into the design surface. This is the best way to start for beginners, but it cannot create a chart-only report.
- ▶ **Report Server Project** This option creates the project solution file, with folders for Data Source items (*.rds Report Data Source files) and Report items (*.rdl Report Definition Language files). If you have existing report items, like shared data sources, that you want to use or edit, choose this selection.

The only drawback to using the Report Wizard is that you cannot use the wizard to create a *gauge-only* report. So for this example, use Report Server Project. We will be using the AdventureWorks samples for many of the reports in this chapter; you can download them from the link listed in Best Reference! This way, you can see how they have been created without the stress of starting from scratch.

Figure 2-2 shows the SSRS Business Intelligence Design Studio (BIDS) user interface and the New Project dialog box that you will see when you start the application.

1. Open the Business Intelligence Development Studio (BIDS)—it is usually found in the SQL Server 2008 Program Group on the Start menu.
2. Click the New Project button as shown in Figure 2-2; select the Report Server Project template from the dialog box.
3. Give the report project a meaningful name.
4. Click OK to create the solution file and close the dialog box.

The Report Designer user interface will appear. If you have used Visual Studio before, it will look familiar. Let's review the different areas of the interface and prepare for creating reports.

The Report Designer interface has three main pane areas as shown in Figure 2-3.

- ▶ The Solution Explorer pane and Properties pane are usually located along the right column (G and H). The Solution Explorer pane shows all the data sources and report items for this reporting solution project. Folders for each object type (data sources, reports) are visible even when they are empty. Right-click the folder to get a context menu. The Properties pane shows all the details for a selected item.
- ▶ In the left column are the Report Data pane and the Toolbox pane (A and B). The Report Data pane is where you create report data sources, datasets, parameters,

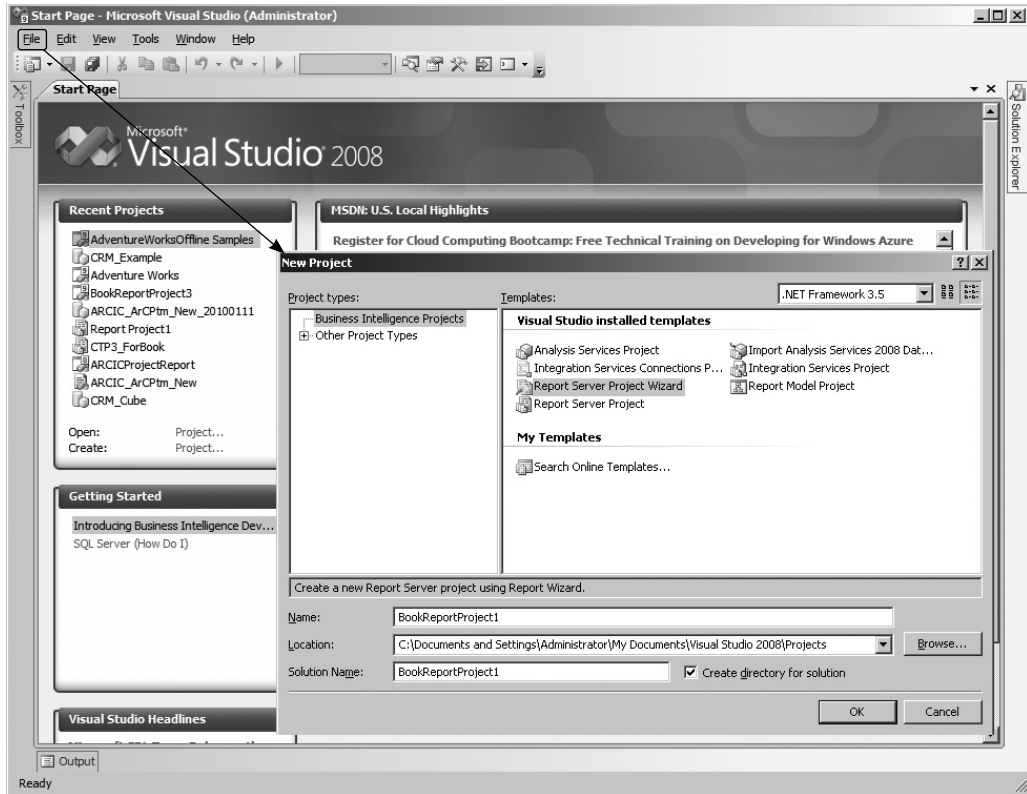


Figure 2-2 *Business Intelligence Development Studio 2008 New Project—Report Server Project*

and images. The Toolbox pane contains all the controls that can be dragged onto the report design surface.

- The center area, referred to as the design surface (C), is where all the elements come together to create a report.

Also, for chart reports, there are three design surface areas for adding data to the report:

- The Chart Data area organizes how the data are displayed. Data Fields (D) is the area to drop measurement data fields. Category Groups (E) is the area to drop category fields (or dimensions)—the X axis.
- Series Groups (F) is the area to drop series fields (or dimensions)—the Y axis.

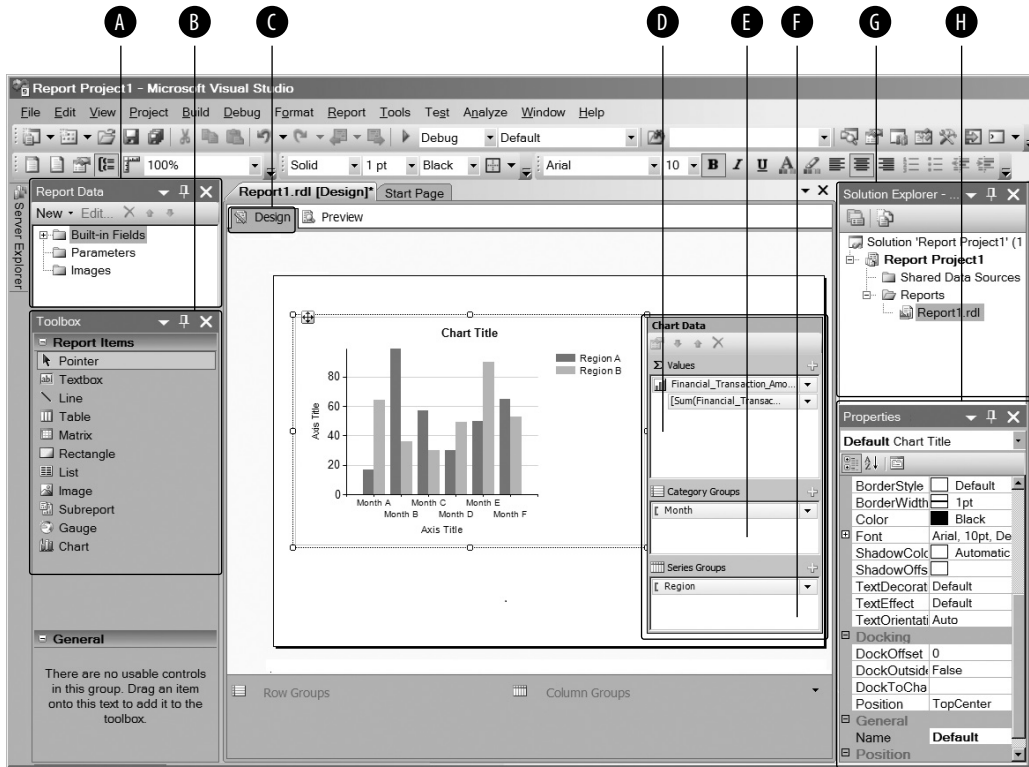


Figure 2-3 Report Designer interface overview—the many areas of the Report Designer user interface

You will see the solution name at the top of the Solution Explorer pane.

1. To get started with this report, create the data source. Right-click the Shared Data Sources folder and select New Data Source from the context menu as shown in Figure 2-4. As a best practice, give it a meaningful name, not the default Data Source 1.
2. Select the source type from the drop-down list under Type. Available choices are: Microsoft SQL Server, Microsoft SQL Server Analysis Services, Report Server Model, Oracle, SAP, XML, ODBC.
3. Type in the connection string in the proper format (data source=server_name; initial catalog=database_name) or click the Edit button and fill in the dialog box with the Server name, select a database name from the drop-down list, and click the Test Connection button at the bottom.
4. Click OK to close this dialog box. Click OK in the Shared Data Source Properties dialog box and the new data source will appear in the Data Sources folder.

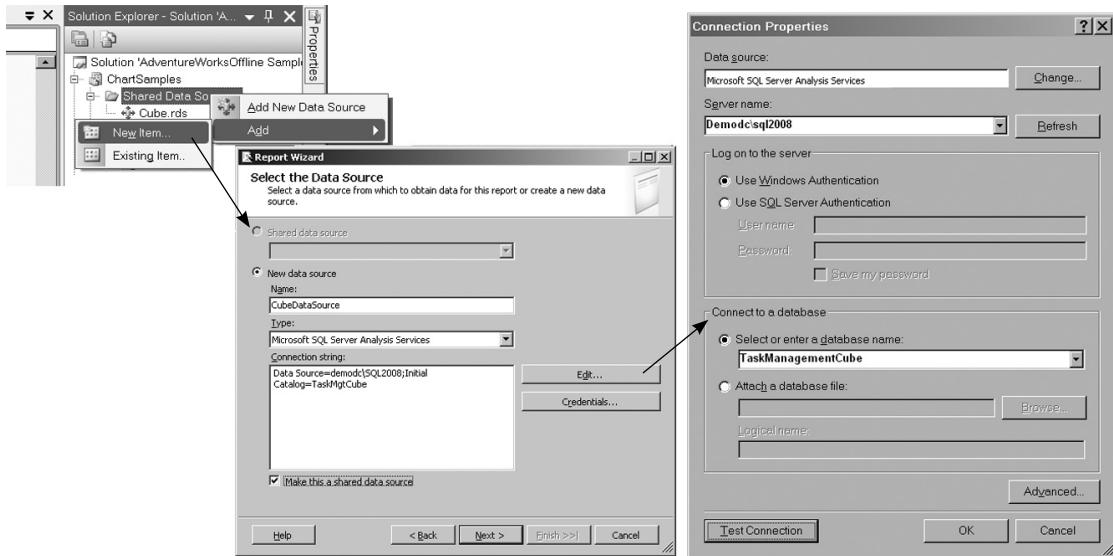


Figure 2-4 Add a New Data Source, Shared Data Source Properties, and Connection Properties

Add a new report item using the same procedure as adding a new data source.

1. Right-click the Reports folder in the Solution Explorer pane, and from the context menu, choose New Item as shown in Figure 2-5.
2. Select Report from the Templates pane of the dialog box.
3. Give the report a meaningful and descriptive name; it is okay to include spaces in the report name (but beware that spaces will pad the report URL with %20 if you are working in Report Server SharePoint integrated mode).
4. Click the Add button at the bottom of the dialog box.
5. The new named report shows in the Reports folder of the Solution Explorer pane, and the design surface displays.

By creating shared data sources, you make them available for all reports that are created within the report project. When creating the report items' data source, dataset, and parameters, SSRS 2008 Report Designer behaves differently from the 2005 version. Instead of having a tab at the top of the design surface for the data, there is a side pane, like the Toolbox. It is this side pane location where you create individual report data sources, create datasets, and specify parameters.

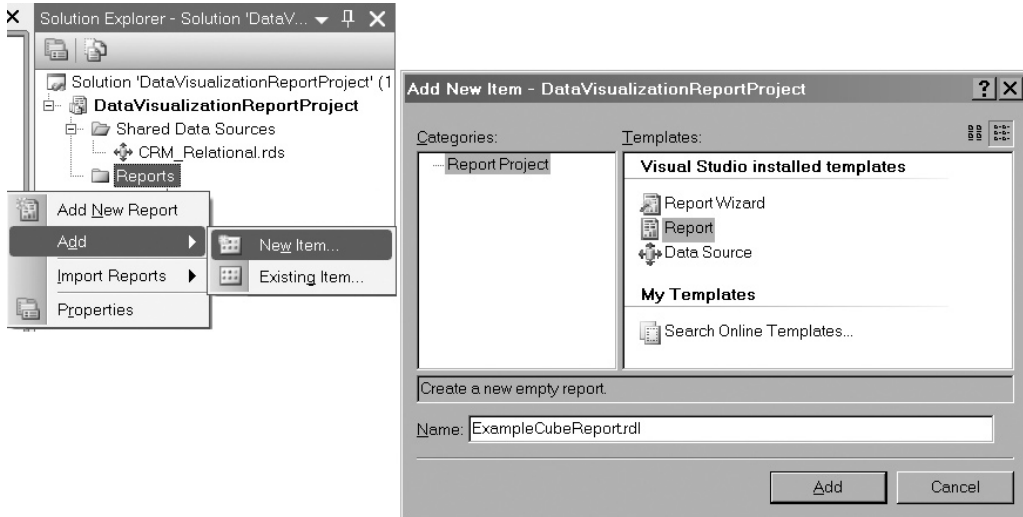


Figure 2-5 Reports context menu—Add New Report Item



BI TIP

In practice, most reports use an embedded data source with authorization credentials contained in the report definition—however, it makes sense in an organizational setting to take time and create standard “shared” data sources that can be used by other report design personnel.

1. Choose Data Source from the New drop-down menu in the Report Data pane, as shown in Figure 2-6.
2. In the Data Source Properties dialog box, give the data source a meaningful name. Select the radio button for an existing shared data source, and choose from the drop-down list. Click OK.
3. Now choose Dataset from the drop-down menu.
4. Enter a dataset name.
5. If confident of your skills in SQL (relational data sources) and/or MDX (OLAP data sources), type your query into the query window. The alternative is to click the Query Designer button, located near the bottom of the Dataset Properties dialog box.
6. The Query Designer appears for the data type defined. Since we have chosen an OLAP data source, the MDX Query Designer appears as shown in Figure 2-7.
7. Select the Measures and Dimensions from the Metadata pane and drag them into the pivot table to select them for the dataset query. Drag dimensions into the top pane to use them as filters.
8. When satisfied you have the proper dataset, click OK to finish.

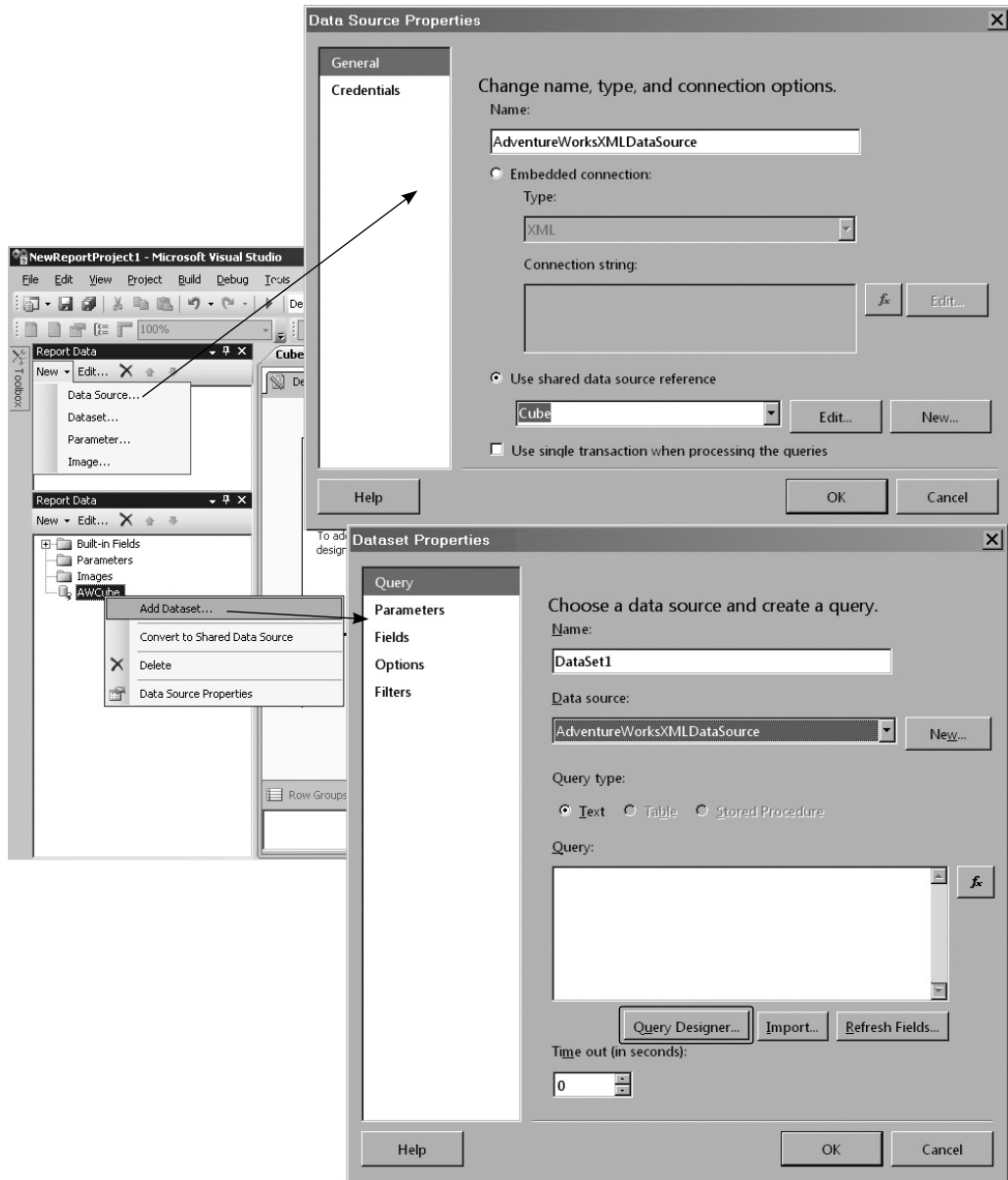


Figure 2-6 Report Data pane in Report Designer 2008—report data sources and datasets

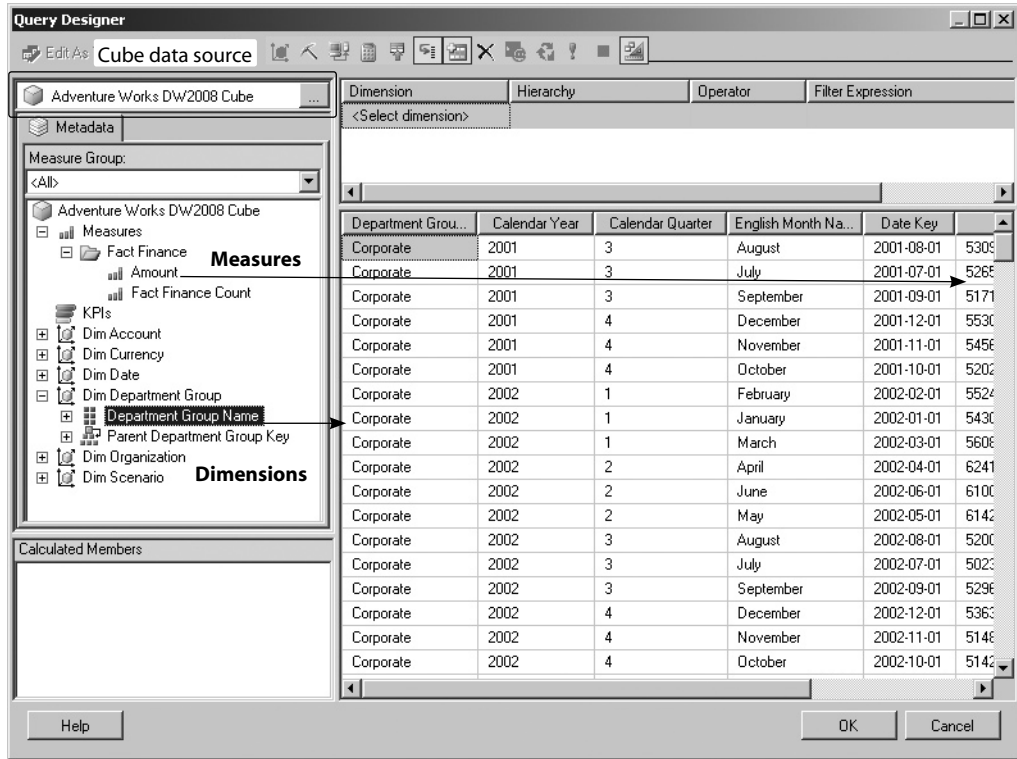


Figure 2-7 Report Designer MDX Query Designer

You now have a report and dataset to work with in SSRS Report Designer.

We promised a peek at Report Builder 3.0, so in this chapter we will build a report in Report Builder 3.0. Fortunately, the chart and gauge controls work the same in both Report Designer and Report Builder. Property pane sections and properties are the same. So no matter which report creation tool you are using, you will have a similar design experience.

SSRS Report Manager and the Report Builder 3.0 Interface

Report Builder is a click-once downloaded browser-based application and can be launched from a SharePoint Portal Report Center site, from a locally installed copy, or from SQL Server Report Manager.



BITIP

Use Report Builder when you have an “SSRS report model” and a straightforward report request. You will be amazed at how quickly you can generate a well-formatted, visually appealing report that combines different display elements to communicate the message!

This example shows SQL Server Report Manager in native mode, which is a self-contained web site. SharePoint integrated mode of Reporting Services will be covered in the next chapter. The home page for Report Manager has two views: List view and Details view, shown in Figure 2-8. The List view has icons, object names, and descriptions. The Details view also allows editing, moving, and deleting the objects.

Report Manager has the same basic functionality as previous versions, but a vastly improved user interface and several improved features, including the ability to add Charts, Gauges, and Maps to ad hoc reports. Previous versions of Report Builder required a report model to use as a data source. Report Builder 3.0 can use report models, shared data sources, or an embedded data source for a new report.

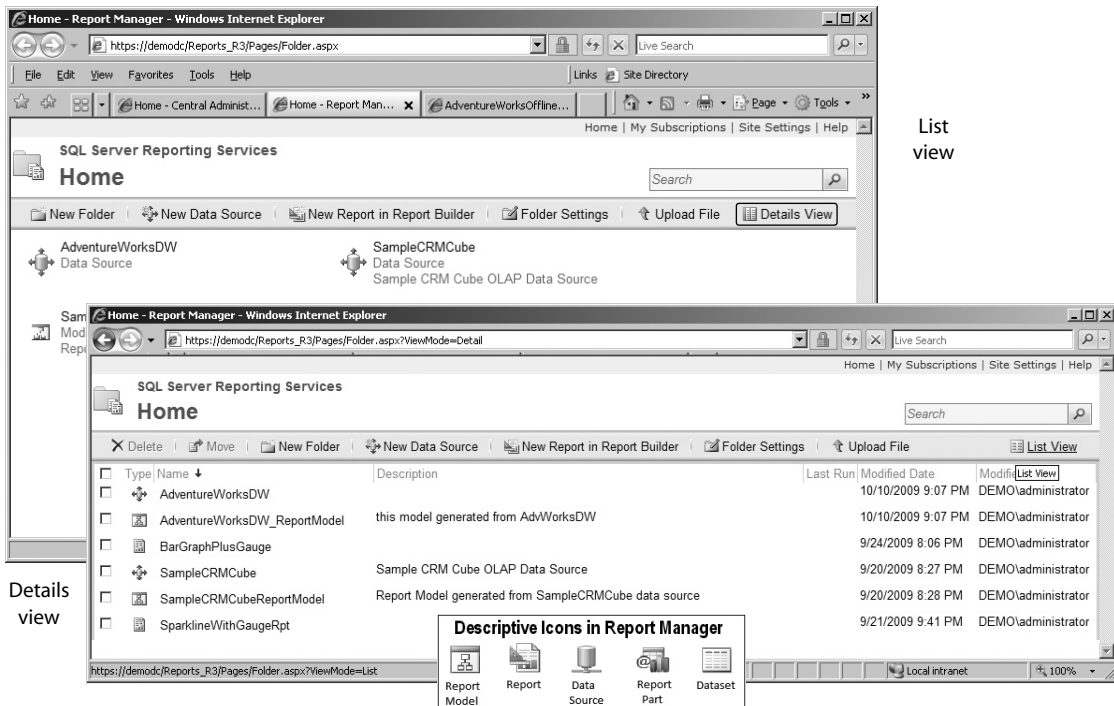


Figure 2-8 SQL Report Manager Home

Data sources specify which server and database to use for reports; they are generally in the form of a connection string:



```
data source = SQLServerName; initial catalog = MyDatabaseName.
```

BEST REFERENCE

For connection string formats: www.connectionstrings.com/

Understanding Report Models

Report models are based on the data model of the database (the tables and relationships between them). Report models are sometimes visualized as entity relationship diagrams, or ERDs. Figure 2-9 shows an example entity relationship diagram. This type of diagram is useful for understanding the way data is stored and how it is related. The diagram shows the tables that hold the data; the lines between the tables represent the relationships between the tables and express how the data is related.

For example, in the diagram in Figure 2-9, the FactLabor table is the main or Fact table, which holds the data we are most interested in and want to measure (in this case we measure labor hours by employee); all the other tables in this example diagram (DimTablename) are called dimension tables and hold descriptive information about the data in the FactLabor table. In this example, the FactLabor table has an attribute called CompanyKey, which is linked to (related to) the DimCompany table through that table's CompanyKey. Similarly, the FactLabor table EmployeeKey attribute is the link to the DimEmployee table.

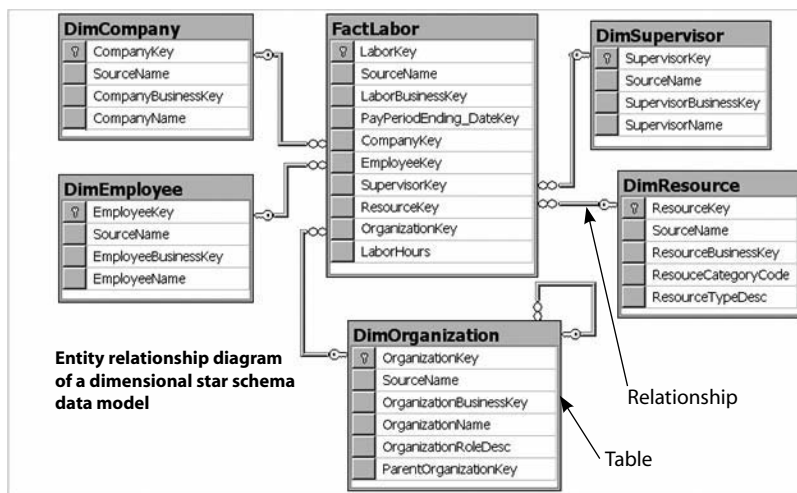


Figure 2-9 Example of an entity relationship diagram

One other relationship of note in Figure 2-9 is on the DimOrganization table, where there is a relationship from this table to itself (aka a fishhook). The structure of the DimOrganization table represents the organizational structure for the company that uses this database. The organizational structure is hierarchical—meaning that there is the C-Suite at the top of the organizational pyramid, which breaks down into lines of business, which splits into divisions, which are made up of departments, which decompose into offices. We would call this a parent-child relationship, where the top or upper level is the parent of the subordinate level. The DimOrganization table has an attribute named ParentOrganizationKey, which is the OrganizationKey for the parent. We structure the data this way so that we can roll up or aggregate the data at the various levels of the organization, and so we can determine responsibility and span of control.

Figure 2-9 shows an example of an entity relationship diagram of a dimensionally modeled database. Dimensional designs are optimized for reporting. We provide this data model detail so that you will understand what is going on behind the scenes when you are using a report model to create a report.

Report models predefine the relationships in the data, saving the report author from having to specify complex joins. So in Report Builder, you are presented with a list of Entities and Columns you can choose from, and the framework understands how the data are related. It is also easier to create a report model from an existing data source in Report Manager. In order to create a new report model from an existing data source, navigate to the Report Manager site, either in native (stand-alone) mode or SharePoint integrated mode; both types of implementation support this feature. For our example, we are showing screenshots from native mode.

**BI TIP**

If you want specialized report models that only display certain views of the data, they can be constructed in Business Intelligence Development Studio (BIDS) where a more sophisticated set of options are available to the report designer.

Create a Report Model

Now that you understand some of the basics behind Report Manager and Report Builder, including the role of the report model, it is time to create one for use. To create a Report Builder report, we'll first create a report model. To create a new report model from an existing data source in Report Manager, follow this procedure:

1. In Report Manager, click the Details View button in the toolbar.
2. Select a data source to work with by double-clicking it, for this case, the data source labeled AdventureWorksDW.

3. The Data Source Details screen will display all the data source connection information, as shown in Figure 2-10. Click the Generate Model button in the toolbar.
4. The Generate Report Model screen will display, allowing entry of Name and Description. When you've entered these, click OK to complete the process.
5. Once the report model is generated, the Report Model Properties screen will display as shown in Figure 2-11, allowing update to any properties that weren't set during initiation.
6. Click the Apply button on any of the screens to save changes.
7. Report models have a variety of properties, just like all the other SQL objects we have been examining. Figure 2-11 shows that the report model has panes of information for: general Properties, Data Sources, Dependent Items (reports created which use this report model), Clickthrough, Model Item Security, and Security.

The Report Model Properties are organized into several screenfuls or panes of information:

- The Properties pane has the Name, Description, and visibility properties, as well as created by, create date, modified by, and modified date metadata for this report model.

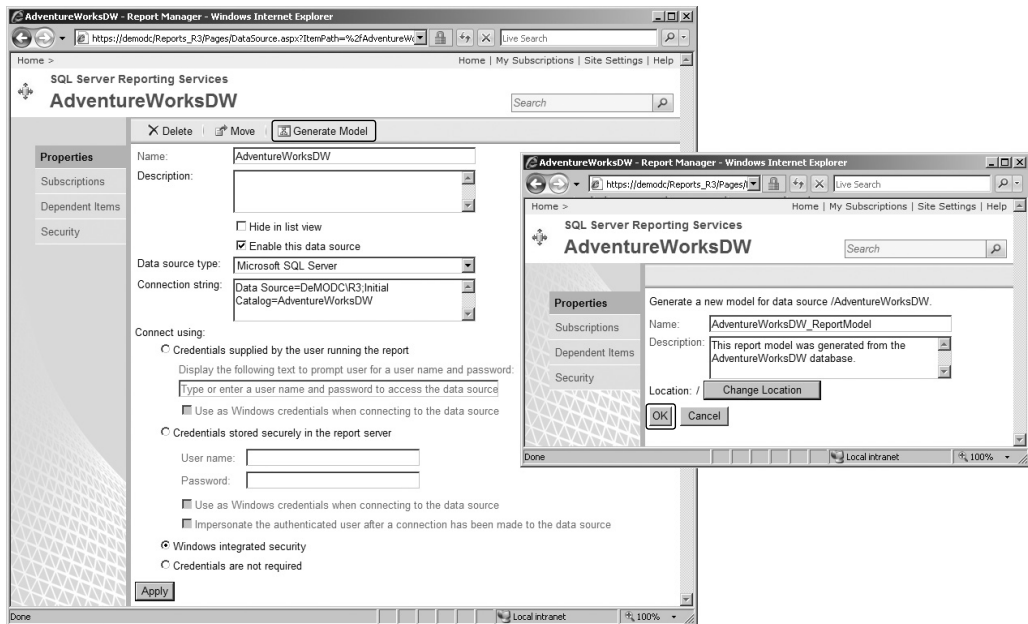


Figure 2-10 Generate a report model from a data source



Figure 2-11 Report Model Properties

- ▶ The Data Source pane contains the link to the data source stored in Report Manager.
- ▶ Dependent Items lists all the reports that use this report model as a source.
- ▶ As shown in Figure 2-11, the Clickthrough pane allows the definition of one individual instance detail listing report and one multiple instance detail report for each entity in the report model. Why is this useful? Perhaps you want to set a data filter, like on Geography/Region, but you can't remember exactly how the region name is formatted. Using the Clickthrough report for the DimGeography table would provide a list of all the regions.

- ▶ Another nice feature is found on the Model Item Security pane. Each Report Manager item can be secured—folder, report, data source, report model, image item, etc. The Model Item Security allows you to secure individual model items independently, or to inherit permissions from the parent item. This would allow you to restrict access to secure, sensitive, or confidential information, but still allow the report model to be used by all who have authority. For example, in our report model example of labor information, maybe the DimEmployee table has access restricted to the Human Resources department. When creating reports, the HR department can use the DimEmployee table found in the report model to display the employee name, along with labor hours. If the same report were created by another report creator outside the HR department, that employee could only retrieve the EmployeeKey attribute of the FactLabor table, not the name or additional information.
- ▶ The Security pane is where the role-level security is set for the entire report model.



So now that we have a report model created, we can create a Report Builder 3.0 report.

BITIP

Report models are reusable definition files that simplify the report creation process by shielding the end user from having to specify data source connection strings and data model particulars, like SQL joins. Build multiple report models from one data source to expose different slices of information and provide broad access to information by your savvy end users.

Create a Report Builder 3.0 Report

As referred to earlier, Report Builder is an application that must be launched from Report Manager or SharePoint. Our example is using Report Manager.

To launch Report Builder in Report Manager, bring up the SSRS Report Manager home page, then:

1. Click the New Report In Report Builder button on the toolbar in Report Manager, as shown in Figure 2-12.
2. The Report Builder click-once application will launch, and the Report Builder user interface will display.

Figure 2-12 shows how Report Builder will open in a new browser-based application window. Let's review the design interface before constructing the report. It is very similar to BIDS, with the look and feel of the PerformancePoint Dashboard Designer. Figure 2-13 dissects the user interface for Report Builder 3.0:

- ▶ Figure 2-13 shows the Shortcut menu at the top is reminiscent of the Office Quick Access Toolbar, but it is not configurable—what you see is what you get (A).

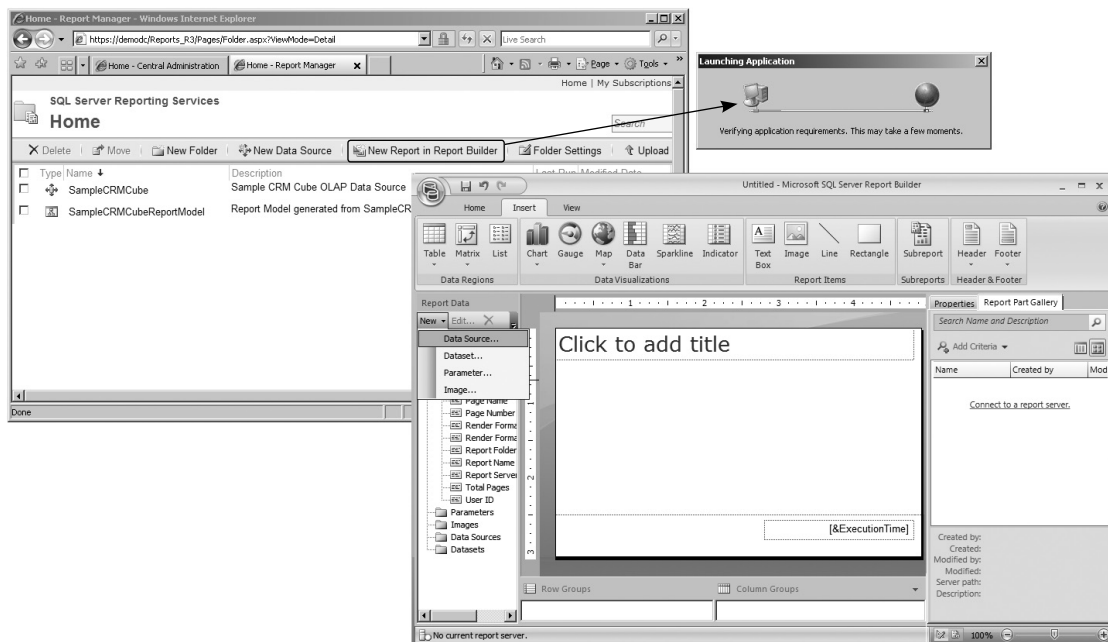


Figure 2-12 Report Manager and New Report Builder report

- ▶ The main file menu is hidden in the Report Builder logo (B), which when examined up close resembles the SQL Server “potato chip” icon. The Options menu is also found here. There are four ribbon menus; those are examined next.
- ▶ The Insert Menu shows the data region, data visualization, and other report items that are available, including the Gauge component (C).
- ▶ The Report Data pane is on the left side (D) and contains the data source connection, the dataset queries, report parameters, and any images used on the report.
- ▶ The middle pane is the report design surface (E), which are displays for row groups and column groups.
- ▶ The right side is the Properties pane (F).
- ▶ At the bottom are the Design Mode vs. Run Mode indicator (enlarged at G), the server connection display (H), and the Zoom slider control (lower right corner).



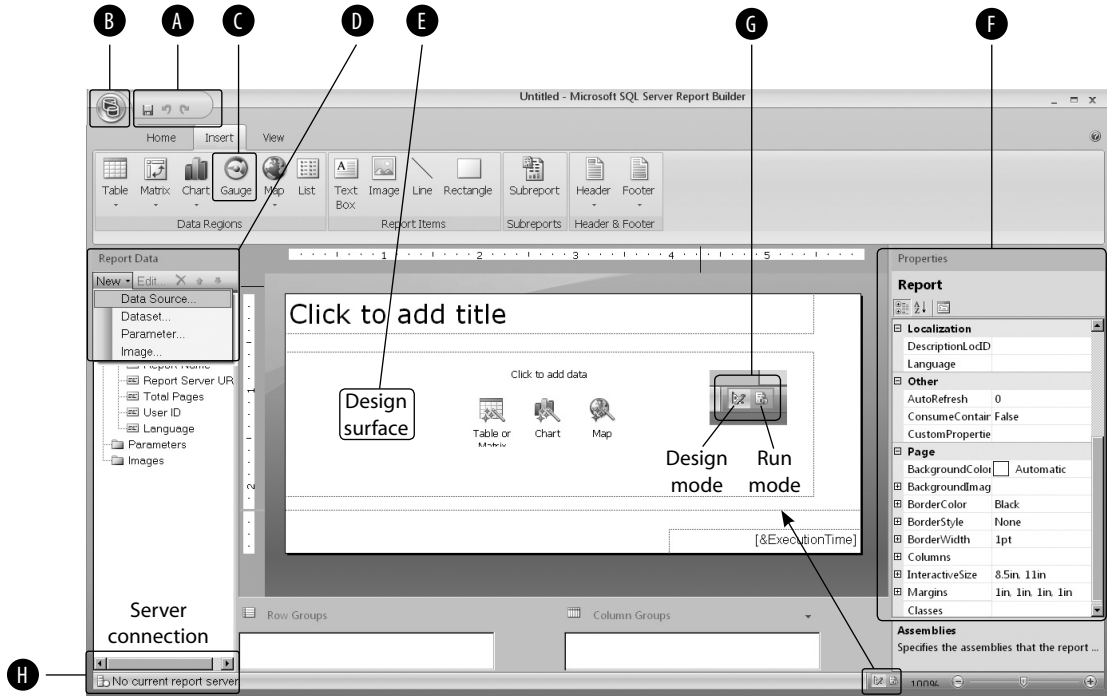


Figure 2-13 Report Builder 3.0 report design interface

To create a new report using Report Builder, follow this sequence of activities:

1. Choose a Report Model as the data source. Create a Dataset from the Report Model.
2. Decide which Data Region Control to use.
3. Drag the Gauge Control onto the design surface.
4. Set properties for each of the data regions and components through the Properties pane.
5. Preview the report by clicking the Run button on the Home ribbon menu.
The mode will be displayed as an icon at the bottom right of window.

Even though the information displayed is very similar to BIDS, the user interface for Report Builder is friendlier and more Office-like, and less intimidating to report authors who are not software developers.



BITIP

Most users will find the Report Builder to be their tool of choice. And, it's universally available—the user simply “clicks once” on a link provided by a SQL Server administrator, to download the Report Builder to the user's client machine.

Report Builder Menus

There are four ribbon menus available in Report Builder 3.0: Home, Insert, View, and Run. Here are the structures of the ribbon bar menus that you will find in Report Builder 3.0.

Figure 2-14 shows the Home menu for Report Builder; it toggles with the Run menu. The Home menu has several sections:

- ▶ Run or Design View toggle.
- ▶ The Clipboard section has Cut, Copy, and Paste buttons; under the Font section are controls for Font name, size, decoration, color, and shrink and grow.
- ▶ The Paragraph section has properties for vertical and horizontal alignment, indent, and bulleted or numbered lists.
- ▶ The Border section includes line thickness and line style, shading, line color, and custom border properties.
- ▶ The Number section has a drop-down for Type (Default, Number, Currency, Date, Time, Percentage, Scientific, Custom); a button to display placeholders or sample data; preset buttons for Currency, Percentage, and Commas; and buttons for decimal places.
- ▶ The Layout section has buttons for Merge (tablix) cells, Split cells, and Align (use to align multiple selected items). The submenu for alignment is: Bring To Front, Send To Back, Align [Left, Center, Right], Align [Top, Middle, Bottom].

Figure 2-15 shows the Report Builder Insert ribbon menu. The Insert menu is composed of these elements:

- ▶ The Data Regions section has controls to insert: Table, Matrix, and List.
- ▶ The Data Visualizations sections has the first-class visual objects: Chart, Gauge, Map, Data Bar, Sparkline, and Indicator.

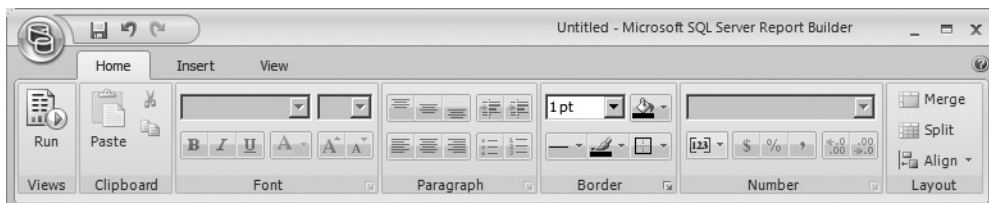


Figure 2-14 Report Builder Home menu

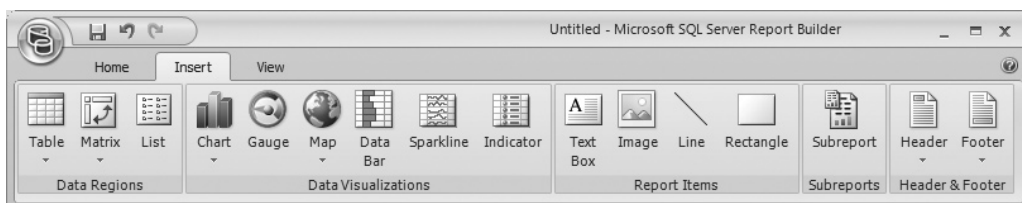


Figure 2-15 Report Builder Insert ribbon menu

- ▶ Report Items include: Text Box, Image, Line, and Rectangle.
- ▶ Subreports—click this button to insert a subreport and configure its connection with the parent report.
- ▶ The Header & Footer section has toggle buttons to turn the header area and footer area on and off.

Figure 2-16 displays the Report Builder View ribbon menu. This is where the display options are set.

- ▶ Show/Hide: Report Data, Grouping, Properties (pane), Ruler, and the new Report Part Gallery.

Figure 2-17 shows the Run menu, which toggles with the Home menu. The Run menu displays when you click the Run button on the Home menu to preview your report; it has the following elements:

- ▶ Design View is a toggle.
- ▶ The Zoom section has the typical choices: Page Width, Whole Page, 500%, 200%, 150%, 100%, 75%, 50%, and 25%.

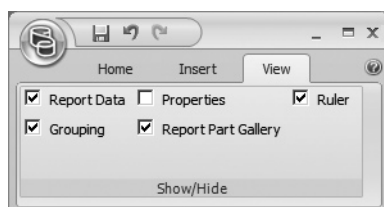


Figure 2-16 Report Builder View ribbon menu

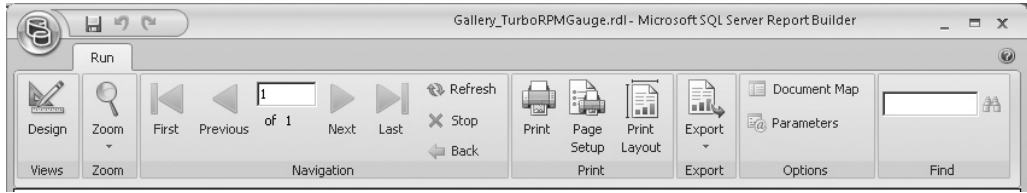


Figure 2-17 Report Builder Run menu

- ▶ The Navigation section has buttons for First, Previous, Page number, Next, Last, Refresh (view), Stop (processing), and Back.
- ▶ The Print section has buttons for Print, Page Setup, and Print Layout.
- ▶ Export options include exporting the report to: XML file with report data, CSV (comma delimited), TIFF file, Acrobat (PDF) file, MHTML (web archive), Excel, and Word.
- ▶ The Options section has toggle buttons to display or hide the Document Map and Parameters.
- ▶ The Find section will find in the report the character string typed into the text box.

Now, when you select Gauge from the Insert menu of Report Builder 3.0, the Select Gauge Type dialog box will appear, exactly as it does in BIDS. Next we will examine the variety of gauge types that can be used to create better reports.

Selecting a Gauge Type

When inserting a gauge into either Report Builder 3.0 or BIDS Report Designer, the Select Gauge Type dialog box will appear, presenting all the choices for gauge varieties. They are broken into two distinct groups—Radial and Linear. Once selected, a gauge cannot be changed from one type to the other.



BI TIP

A gauge can be configured to display a different radial gauge type if it was originally a radial gauge, or a different linear display if it was originally a linear gauge—but radial cannot be changed to linear, and linear cannot be changed to radial.

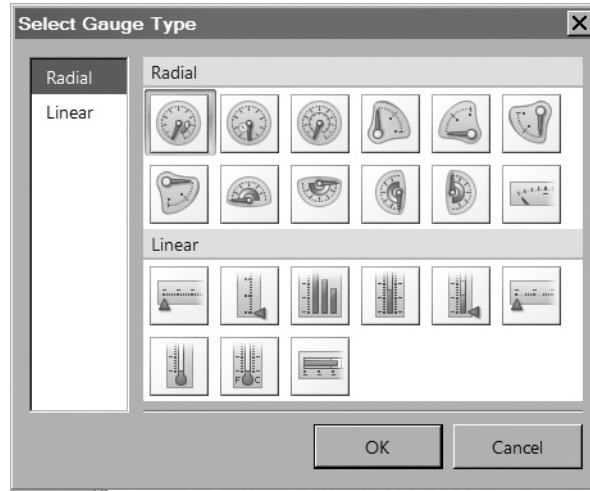


Figure 2-18 Reporting Services gauge types—choose carefully because the gauge type cannot be changed once selected.

Gauge types in the Select Gauge Type dialog box, as shown in Figure 2-18, are created by using a combination of gauge properties. Once you have chosen, you cannot change the gauge type the same way you change a chart type. To change the gauge type, you must remove the gauge from the gauge panel and re-add it to the design surface.

Radial gauges have at least one scale and one pointer, and may optionally have ranges and multiple scales. The most familiar example of using two scales is the Thermometer with one pointer to display both Fahrenheit and Celsius temperature measurements inside one gauge. Another use for multiple scales may be to show one value in two different currencies, or absolute and relative values, like actual score and relative rank. The scale can be configured to start at 0 or a value of your choosing, and have any interval desired.

Pointers identify the value being displayed, and there are three types of pointers: needle, marker, and bar. Needle pointers are only available on radial gauges. Marker and bar are available on both radial and linear gauges.

A linear gauge has a different orientation than a radial gauge, but it functions the same and can be integrated into tabular or matrix reports to show progress meters. Examples at the end of this chapter show how to accomplish integrated reports!

Radial Gauge Overview

Let's start with radial gauges and explore all the different configuration items that can be adjusted to provide a unique display. Semicircular (180°) and quarter-round (90°) vary only by how large the scale sweep is, so they are appropriate for measures that have defined boundaries. Figure 2-19 shows a basic radial gauge and delineates its components.

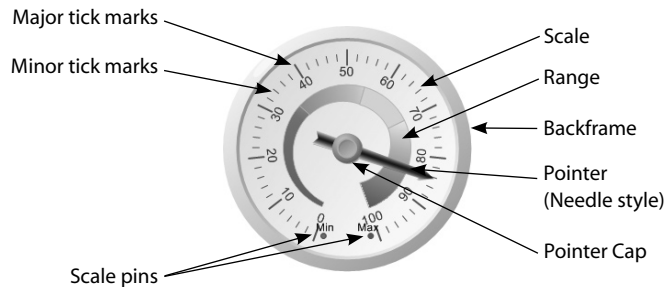


Figure 2-19 *Radial gauge components*

A radial gauge is made up of the following items, and as you may have guessed, there are properties for many of the components. Figure 2-19 labels each of these components, and they are further detailed next. The examples in this chapter will go through the setting of these properties with various values to display the different effects that can be achieved. Each of these gauge components is detailed here.

The gauge frame (BackFrame in the property settings side panel) is the outer shell that surrounds the gauge itself. There is also a gauge panel frame (BackFrame) that you can configure in the same way. It has several properties:

- ▶ **Frame Shape** Set the style of the frame surrounding the gauge. Choices are: circular, rectangular, rounded rectangular, default, autoshape, custom circular, custom semicircular, custom quarter-circular. Or you can import a custom frame image.
- ▶ **Frame Style** Choose none, edged, simple, or custom. This setting can give the frame the appearance of being raised from the page.
- ▶ **Frame Color** Select from palette or custom, and choose gradient or pattern fill styles.

Other gauge properties include

- ▶ **Glass Effect** Choose none, simple, or custom. This gives the gauge the appearance of being under glass, like a speedometer. The Glass effect can be set on either the gauge panel backframe, the gauge backframe, or both. Be careful when you set this, because if you choose both, the gauge will appear to be dim under two layers of glass.
- ▶ **Scale(s) and Scale Label** Set the sweep angle in degrees, the minimum and maximum values, the interval, the radius of the scale (how much distance between frame and scale), and the width of the scale.

- **Scale Pins** Choose whether to have minimum and maximum pins, their color and shape, and their distance from the scale. Scale pins can be used to show minimum, maximum, or boundary values that are significant in relationship to the gauge scale.
- **Major Tick Marks** This setting determines the interval, how long, how bold, and what shape the tick marks are in the gauge scale. If you are using a radial gauge, think about the difference between the minimum and maximum values and what level of granularity is important. This will also help you decide which sweep distance is needed as well.
- **Minor Tick Marks** This setting controls how long, how bold, and what shape the minor tick marks are, or if they are displayed at all.



BITIP

Tick marks are an important design component for giving a gauge context. The range of values, the interval between the marks, and the labels you apply will impact the gauge display, and it may become too cluttered. When formatting minor tick marks, ensure that they are smaller and lighter in color than the major tick marks. If the display looks too cluttered, increase the interval value of the major tick marks and decide if minor tick marks are even necessary to the display.

Radial Gauge Elements

Now that you can identify all the parts to the radial gauge, let's discuss some of the important elements and how they are used to convey the meaning of the displayed data.

- **Pointer Type** This setting governs the type of pointer used on the gauge; it can be set to needle, marker, or bar. Needle is only available on radial gauges. If the needle type is selected, there are various needle styles to choose from: Triangular, Rectangular, Tapered with Tail, Tapered, Arrow with Tail, Arrow, Stealth Arrow, Stealth Arrow with Tail, Tapered with Stealth Arrow, Stealth Arrow with Wide Tail, Tapered with Rounded Points. If the marker type is selected, these are the marker style choices: Rectangle, Triangle, Circle, Diamond, Trapezoid, Star, Wedge, Pentagon. And if the bar type is chosen, you can have it start at zero or at scale start. Choose a pointer type that will complement the type of data. If you are showing % complete, then a bar pointer style might be better; if you are displaying a rate, like miles per hour (mph), then a needle style will convey the context better.
- **Pointer Cap** The pointer cap is the button in the middle of the gauge that the pointer extends from. You only need a pointer cap when the Pointer style is needle. The style choices for pointer caps are: Rounded Dark, Rounded, Rounded Light, Rounded with Additional Top, Rounded with Wide Indentation, Rounded

with Indentation, Flattened with Indentation, Flattened with Wide Indentation, and Rounded Glossy with Indentation. Other pointer cap properties include the Fill Color, Fill Gradient, Reflection, and Width. You can also upload a custom image to use for the pointer cap.

- ▶ **Ranges** Ranges are color bars that can be situated inside or outside of the scale and indicate zones for data comparison. When talking about KPIs and Performance Metrics, we usually think of the stoplight colors for ranges—Green (good values), Amber (something amiss), and Red (danger zone)—although those are constructs of our own making, and certainly open to challenge. When creating ranges on a radial gauge, there are many properties and options to get just the visual effect you desire. Ranges have border color, fill color, fill gradient, shadow, start width, end width, distance from scale, and placement settings. Ranges can also have actions, in range bar pointer color, in range label color, and in range tick mark color. ToolTips help differentiate values within a particular range.
- ▶ **Gauge Label** This is the basic title for the gauge, like a chart title.
- ▶ **Border** The border is the very outer delineation of the gauge container. Border options include Line Style, Line Width, and Color.

Figure 2-20 shows a gauge with many properties set, just to give an idea of how much the display can be altered from the original example (Figure 2-19). The border has been selected as semicircular, the gauge frame is simple, the color was changed slightly from before. The ranges were located outside the scale. The pointer cap was enlarged and has a black border, and the needle became the arrow with a more conspicuous pattern.

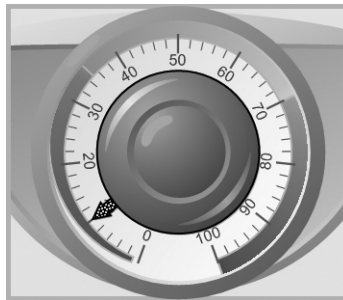


Figure 2-20 Example radial gauge with all properties set