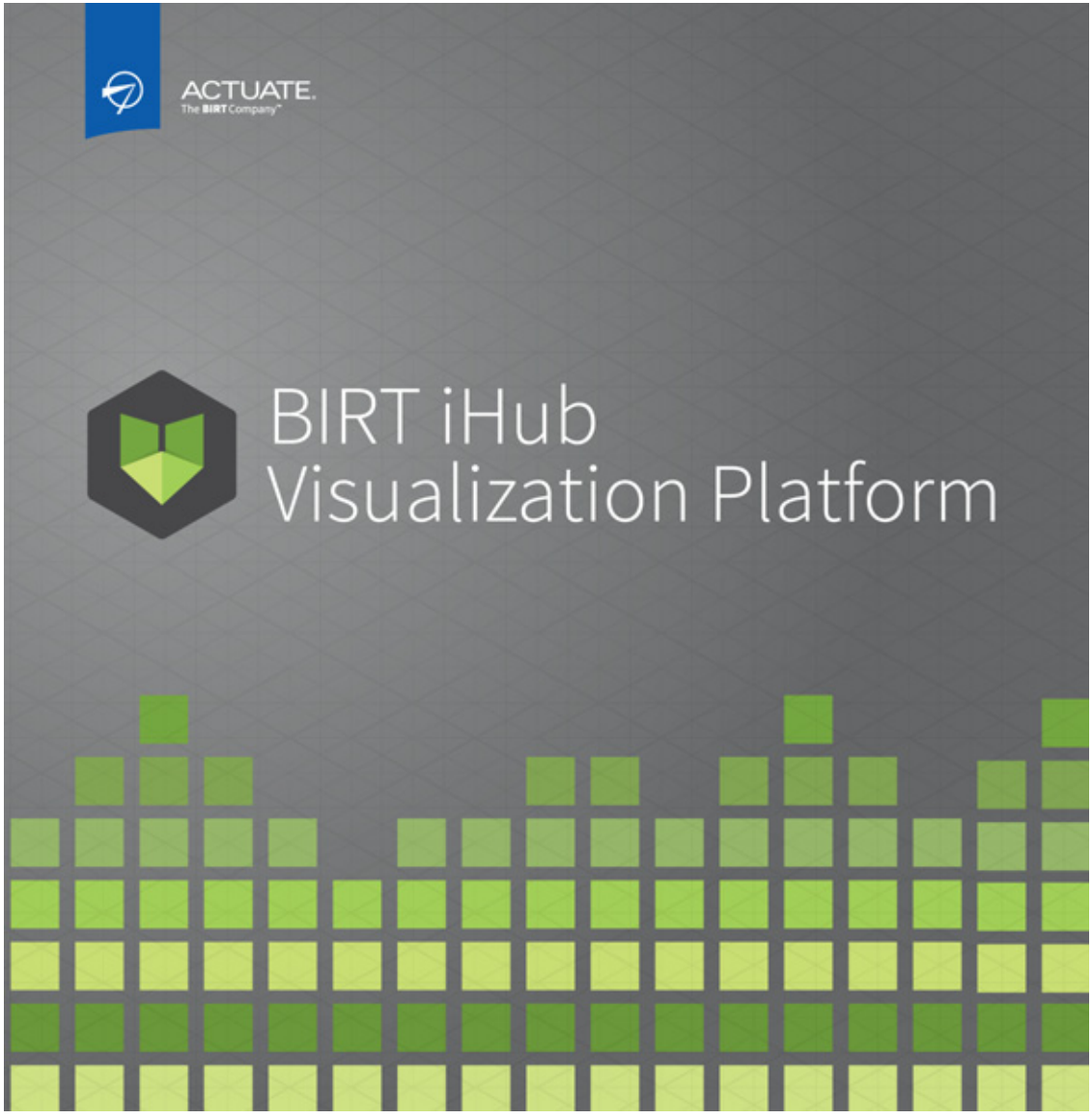

Using Report Studio

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About *Using Report Studio*

Using Report Studio provides information about using the Report Studio report design tool to design a report.

- *About Using Report Studio.* This chapter provides an overview of this guide.
- *Part 1. Creating BIRT designs.* This part describes the tasks that users complete to design reports.
- *Chapter 1. Using Report Studio to create a BIRT design.* This chapter introduces Report Studio and describes how to create, lay out, save, and run a report. The chapter contains a tutorial that guides users through the report creation process.
- *Part 2. Accessing data.* This part explains how to obtain data for your BIRT design using Report Studio.
- *Chapter 2. Providing data to a BIRT design.* This chapter explains how to use a template and theme, and how to select a data source for your BIRT design.
- *Chapter 3. Combining data from multiple sources.* This chapter explains how to join information objects to access data from multiple data sources.
- *Part 3. Building BIRT application components.* This part describes how to create BIRT components such as a summary table, a cross tab, or a chart.
- *Chapter 4. Working with summary tables.* This chapter describes how to create and modify summary tables, as well as how to change table types.
- *Chapter 5. Presenting data in a cross tab.* This chapter describes how to create a cross tab and obtain data for a cross tab.
- *Chapter 6. Presenting data in a chart.* This chapter describes the types of charts you can create, and discusses the procedures for displaying and formatting data in a chart.

- *Part 4. Enhancing BIRT application components.* This part contains information about enhancing your BIRT design by editing and formatting the report, inserting calculations, organizing data in the report, creating aggregate data, and creating filters to view specific data in a report design.
- *Chapter 7. Editing and formatting report content.* This chapter describes the formatting options in Report Studio, including applying a theme, changing font properties, changing the display of data and formatting data based on conditions. The chapter also describes how to merge several columns into a single column, and work with data in merged columns.
- *Chapter 8. Inserting calculated data.* This chapter describes how to write expressions to calculate data.
- *Chapter 9. Organizing data in a report.* This chapter describes how to sort and group data, and suppress duplicate values.
- *Chapter 10. Aggregating data.* This chapter describes how to aggregate data and display a summary report.
- *Chapter 11. Filtering data.* This chapter describes how to create filters to display only the information that your report needs. The chapter also explains how to prompt for filter values at run time by creating static and dynamic filter parameters.
- *Chapter 12. Linking content.* This chapter describes how to use bookmarks and hyperlinks in a report element, and explains the procedures to create, modify, and delete bookmarks and hyperlinks. The chapter also describes how to enable and disable default hyperlinks from a data object in a report design.
- *Part 5. Reference.* This part is a reference for all supported functions and operators provided by Report Studio.
- *Chapter 13. Functions and operators.* This chapter is a reference to all the supported functions and operators you can use to create calculated data. The chapter describes the functions you can use to create aggregate calculations, and the operators you can use in expressions, conditional formatting, as well as in filter conditions.

Part One

Creating BIRT designs

Chapter

1

Using Report Studio to create a BIRT design

This chapter contains the following topics:

- About Report Studio
- Overview of the BIRT design creation process

About Report Studio

Actuate Report Studio is a web-based report designer for users who want to create professional-looking reports quickly and easily. Report Studio uses existing data sources and templates to provide the data and basic layout for reports. The intuitive graphical interface enables you to quickly format and rearrange data, sort, group, and filter data, and create computed columns and aggregate data. You can also add charts to visually present the data in your BIRT design. As you edit and format a report, you can instantly preview the changes you make using 50 rows of sample data. You can modify this number to view up to 200 rows of sample data in Report Studio. When you run the BIRT design, Actuate Viewer displays the report with actual data.

Report Studio is customizable, enabling an administrator to integrate custom data sources and templates for users to create reports. Additionally, the administrator can customize the user interface and show or hide functionality to tailor Report Studio to meet your organization's business intelligence requirements.

This guide describes how to use the features available in the default installation of Report Studio. The functionality available to you can differ based on how your system administrator configures and customizes Report Studio.

BIRT designs are XML files designed specifically for web use. Report Studio enables you to create a variety of BIRT designs, such as detail table designs, summary table designs, or cross tab designs, based on your data visualization and business intelligence needs. Each BIRT design consists of a table displaying the data fields you select. A detail design displays the data fields retrieved from an available data source, based on any conditions you specify. A summary table design displays aggregate data for the data fields retrieved from a data source. Aggregate calculations occur at the data set level, improving response time when a large amount of data is involved. In a cross tab design, each cell contains an aggregate value, displayed in a row-and-column matrix facilitating additional analysis of the data.

Once you know what kind of BIRT design you need, you can immediately start creating it. The following section provides an overview of the process to create a BIRT design.

Overview of the BIRT design creation process

Complete the following steps to create a BIRT design:

- Selecting a template and a data source
- Selecting, inserting, and limiting displayed data

- Formatting the BIRT design
- Saving and viewing the BIRT design

Selecting a template and a data source

The template you choose determines the basic layout of your design and which elements are available in the BIRT design. Report items include a report title, page numbers, report-creation date, and a table in which to display report data. You can select which items appear in a BIRT design. Report Studio provides a set of templates you can choose from. For example, to create a simple listing design, select standard template, or to create a cross tab design, select cross tab template. Templates are organized in categories, and can also contain themes that determine the basic appearance of the BIRT design. The theme controls the appearance of the report table.

Data sources contain data sets which contain the data fields that are displayed in the BIRT design. BIRT iHub provides sample data sources of each type for use in Report Studio. A BIRT design accesses data from the following types of data sources:

- A template containing a data set
- An information object data source
- A BIRT data object data source

Selecting, inserting, and limiting displayed data

After you choose a data source, the Table Builder wizard in Report Studio appears, enabling you to select and arrange the data fields to use in the BIRT design. As you select data fields in Table Builder, Report Studio displays the data columns in the order in which you select them. Rearrange the data fields in Table Builder so that the columns appear in the logical order you expect.

When data sources contain more data than you need to display in your BIRT design, you can limit the data retrieved using filters. Table Builder enables you to create a data set filter that narrows the scope of data retrieved from the data source and displayed in the BIRT design. Data set filters can significantly improve design-time performance if the data set contains a large amount of data.

Formatting a BIRT design

Format a BIRT design to improve the appearance of the report. Common formatting tasks include providing a report title, modifying column labels, formatting column data such as setting font properties and alignment, setting standard or custom data formats, and merging data from several columns in a data source to present it in a single field in the BIRT design, where required. You can also specify page layout properties and adjust column width to enable your

BIRT design to accommodate the selected data whether viewed online or in PDF format.

Labels contain static text. In a typical template, some labels are editable, and others are not. Examples of labels you can edit include report titles or author names. Examples of non-editable labels include standard copyright or confidentiality statements.

When you insert data fields in a table, Report Studio displays the values in rows and columns and creates labels, or column headers that show the names of the data fields. These names are appropriate in a database, but usually are not suitable for a report. You typically edit the text in these column headers.

Report Studio also supports several standard and custom formats you can specify based on the type of data in a column. Sometimes data sources store data in multiple fields, when it makes logical sense to display this data in a single field in the BIRT design. For example, a contact name can be stored as two fields, first name and last name, but is easier to read when displayed in a single column in the BIRT design. Similarly, an address field can often be stored in several different fields, but is easier to read when viewed in a single field. In these cases, you can either use a computed column to combine the entries in each field into a new column, or merge multiple columns into a single field in the BIRT design.

Report Studio presents data fields in a table. By default, the width of a table expands to accommodate all the selected data columns. This feature is typical for viewing a report online. Figure 1-1 shows an example of a table that uses the default layout. The columns are approximately the same width, even though the data in the state and zip code columns, for example, occupy less space than the data in the Customer and Street Address columns. If you insert many data fields in a table, you can adjust the width of columns to improve the spacing between the columns.

Customer Directory

Customer	Phone	Street Address	City	State	Zip
American Souvenirs Inc	(203) 555-7845	149 Spinnaker Dr.	New Haven	CT	97823
Auto-Moto Classics Inc.	(617) 555-8428	16780 Pompton St.	Brickhaven	MA	58339
Boards & Toys Co.	(310) 555-2373	4097 Douglas Av.	Glendale	CA	92561
Cambridge Collectables Co.	(617) 555-5555	4658 Baden Av.	Cambridge	MA	51247
Classic Gift Ideas, Inc	(215) 555-4695	782 First Street	Philadelphia	PA	71270
Classic Legends Inc.	(212) 555-8493	5905 Pompton St.	NYC	NY	10022
Collectable Mini Designs Co.	(760) 555-8146	361 Furth Circle	San Diego	CA	91217
Collectables For Less Inc.	(617) 555-8555	7825 Douglas Av.	Brickhaven	MA	58339

Figure 1-1 A BIRT design displaying data in the default table layout

To design a report that shows the same output when viewed online in HTML format or in a page-based format such as PDF, set page properties for the design to modify layout type from Auto Expand Width to Fixed Width. Using the Fixed Width setting, you can specify a page width, and this value is reflected in the

HTML web report, in the PDF version, and in the printed reports. If you use the default Auto Expand Width setting, the page size values can differ for the web report and the PDF or printed reports. The option to modify column width is not available if you use the default Auto Expand Width setting.

If you intend to print a report or export the report to a page-based format, such as PDF or Word, check the report output in those formats to ensure that all the data fits on the page.

Saving and viewing a BIRT design

Report Studio provides a preview of the changes you make, as you create and modify a BIRT design. To view all the data, save and run the report. When you save a report in Report Studio, the BIRT design file with a .rptdesign file-name extension contains all the information necessary to generate the report. Choose Save and View. Your web browser displays the generated report in Actuate Viewer. As you modify a report, save and run the report periodically, and view the changes made in Actuate Viewer to make sure the result is what you expect.

Tutorial 1: Creating a simple BIRT design

This section provides step-by-step instructions for creating a simple BIRT design that lists customers and their contact information. The design uses a standard template and a sample BIRT data object data source, included in the standard BIRT iHub installation.

In this tutorial, you perform the following tasks:

- Start Report Studio.
- Select a template and a data source.
- Select the data to display in the BIRT design.
- Limit the data displayed.
- Sort data in a meaningful order.
- Format the data in the BIRT design to enhance its appearance.
- Save and view the BIRT design.

Task 1: Starting Report Studio

To access Report Studio contact your system administrator to obtain the URL to access BIRT iHub and login credentials.

1 Log in to BIRT iHub.

2 The landing page shown in Figure 1-2 appears, listing the files and folders you can access in the volume. Choose New➛New Report to launch Report Studio, as shown in Figure 1-2.

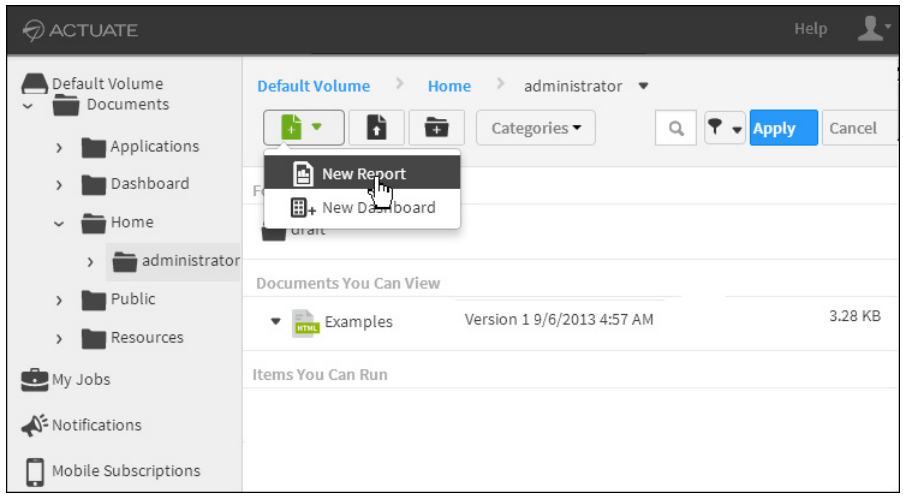


Figure 1-2 Launching Report Studio from an application

Report Studio launches in a web browser, as shown in Figure 1-3, providing the option to either create a new design or open an existing design. In this tutorial, you create a new BIRT design.

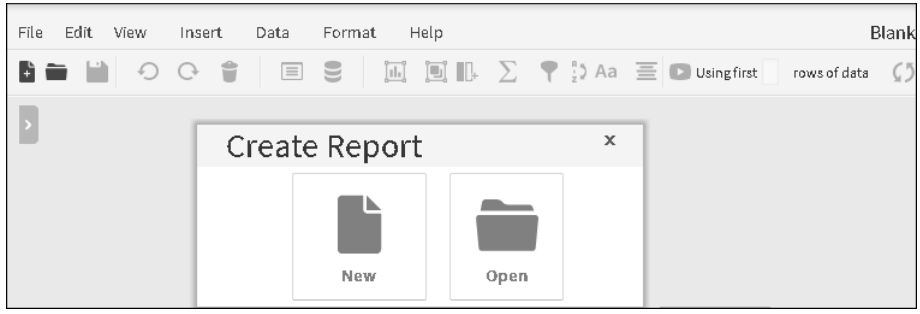


Figure 1-3 Opening an existing report or creating a new one in Report Studio

3 Choose New to create a new BIRT design. Report Template appears. A series of dialog boxes guides you through the report creation process.

Task 2: Selecting a template and a data source

Report Studio provides sample templates and data sources to enable you to create a variety of reports. In this task, you select the standard single table template to create a simple listing report, and the sample data object data source located in the BIRT iHub volume.

In Report Template, perform the following tasks, as shown in Figure 1-4:

1. In Category, if necessary, select Standard.
2. In Available Templates, if necessary, select Single Table, as shown in Figure 1-4.

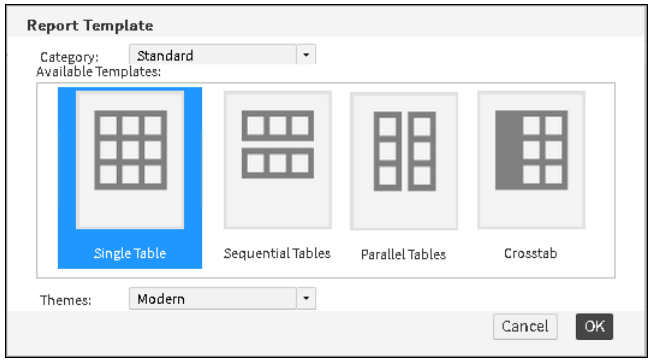


Figure 1-4 Selecting a template

3. In Themes, if necessary, select Modern.

   Choose OK. Select Data appears, as shown in Figure 1-5.

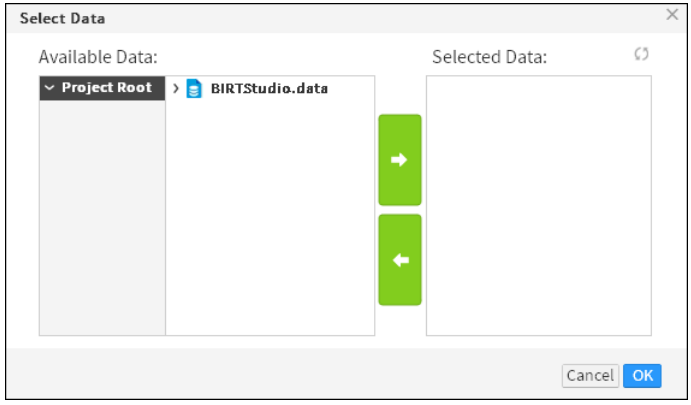


Figure 1-5 Selecting a data source

4. In Available Data, in Project Root, navigate to the folder containing the data object to use and select the data object. Choose the right arrow. The selected data object appears in Selected Data.

   Choose OK.

5. In Select Data Set, as shown in Figure 1-6, select Customers. Choose OK.

   Table Builder appears displaying the data fields in the BIRT data object data source you selected.

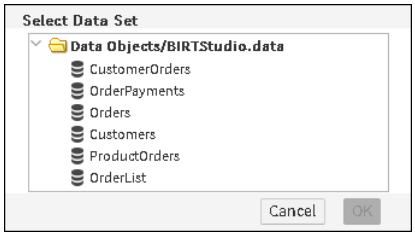


Figure 1-6 Selecting a data set

Task 3: Selecting the data to display

In this task, you use Table Builder to select data fields to use in your new BIRT design.

In Table Builder, shown in Figure 1-7, complete the following steps:

1 In Data, in Use Data From, if necessary, select the Customers data object.

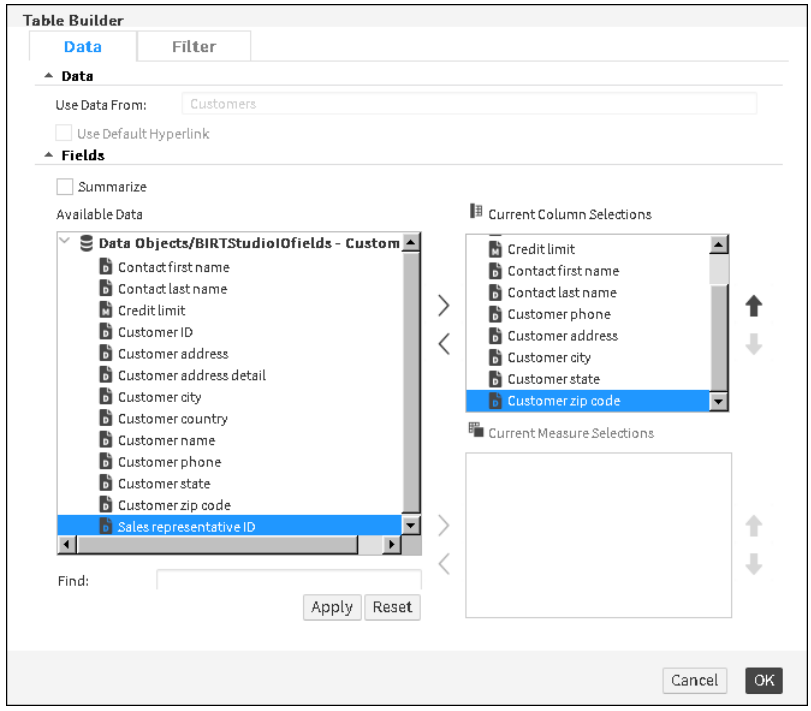


Figure 1-7 Current Column Selections displaying the selected data fields

2 If necessary, deselect Use Default Hyperlink.

This option appears highlighted when the data set you are using contains hyperlinks to other sections in a BIRT design, other BIRT designs in your iHub volume, or external URLs.

3 In Fields, if necessary, deselect Summarize, to create a detail table.

You select Summarize when you want to create a summary table that displays only aggregate data.

4 In Available Data, press Ctrl, and select the following data fields from the list, then choose the right arrow:

- Customer name
- Customer number
- Credit limit
- Contact last name
- Contact first name
- Customer phone
- Customer address
- Customer city
- Customer state
- Customer zip code

The selected data fields appear in Current Column Selections, as shown in Figure 1-7. You can modify the order of data fields by using the up and down arrows in Table Builder—Data.

If the data source contains a large number of data fields, search for a data field by name or using a string, type the name of the field or the string in Find, then choose Apply. You can use the wildcard character (*) if you are using a string. If the data field is found, Table Builder displays the data field, and the category containing the data field in Available Data. Select the field and use the right arrow to use the data field in the BIRT design.

Task 4: Limiting the data displayed

You can now specify a filter condition if you want to limit the data retrieved from the data set and displayed in the report. Using filters is useful when working with data sets that contain large amounts of data. You can use Table Builder—Filter to specify a filter at the data set level. The following example sets a filter condition such that only data for the country USA is retrieved from the data set.

1 In Table Builder, select Filter.

2 In Table Builder—Filter, choose Add Filter, shown in Figure 1-8.

Figure 1-8 Adding a filter condition at the data set level

3 Filter appears. In Filter, complete the following steps:

1 In Filter By, select Customer Country, the column to evaluate.

2 In Condition, if necessary, select the comparison operator, Equal To.

3 In Value, do one of the following:

- Type USA.
- Choose Select Values, then select USA from the list of values.

4 Choose Add Condition. The condition appears in Conditions, as shown in Figure 1-9. Choose Validate. After a message appears confirming that the syntax of the filter condition is valid, choose OK.

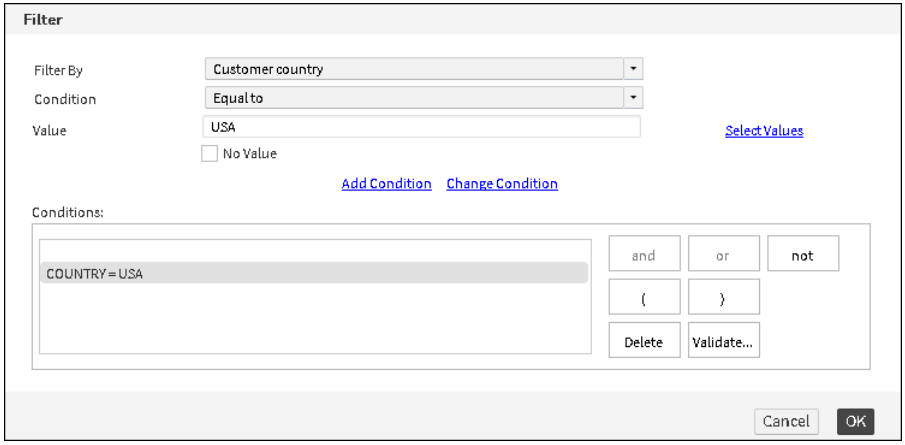


Figure 1-9 Specifying a filter condition

The filter condition appears in Table Builder—Filter, as shown in Figure 1-10. Choose OK.

Figure 1-10 Specifying a data set filter condition

The data fields that meet the filter condition appear in the BIRT design, as shown in Figure 1-11.

CUSTOMERNAME	CUSTOMERNUMBER	CREDITLIMIT	CONTA	AME	PHONE	ADDRESSLINE1	CITY	STATE	POSTALCODE
Signal Gift Stores	112	71800	Jean		7025551838	8489 Strong St.	Las Vegas	NV	83030
Toys4GrownUps.com	205	90700	Julie		6265557265	78934 Hillside Dr.	Pasadena	CA	90003
Boards & Toys Co.	219	11000	Mary		3105552373	4097 Douglas Av.	Glendale	CA	92561
Collectable Mini Designs Co.	239	105000	Valarie		7605558146	361 Furth Circle	San Diego	CA	91217
West Coast Collectables Co.	475	55400	Steve		3105553722	3675 Furth Circle	Burbank	CA	94019
Men 'R' US Retailers, Ltd.	347	57700	Brian		2155554369	6047 Douglas Av.	Los Angeles	CA	91003
Mini Gifts Distributors Ltd.	124	210500	Susan		4155551450	5677 Strong St.	San Rafael	CA	97562
Mini Wheels Co.	129	64600	Julie		6505555787	5557 North Pendale Street	San Francisco	CA	94217
Corporate Gift Ideas Co.	321	105000	Julie		6505551386	7734 Strong St.	San Francisco	CA	94217
Technics Stores Inc.	161	84600	Juri		6505556809	9408 Furth Circle	Burlingame	CA	94217
The Sharp Gifts Warehouse	450	77600	Sue		4085553659	3086 Ingle Ln.	San Jose	CA	94217
Signal Collectibles Ltd.	487	60300	Sue		4155554312	2793 Furth Circle	Brisbane	CA	94217

Figure 1-11 Report Studio displaying the BIRT design

Task 5: Sorting data

In this task, you improve the appearance and usability of the BIRT design by sorting data alphabetically by customer name.

How to sort data

Select and right-click the Customer Name column. Choose Sort➛Sort Ascending, as shown in Figure 1-12.

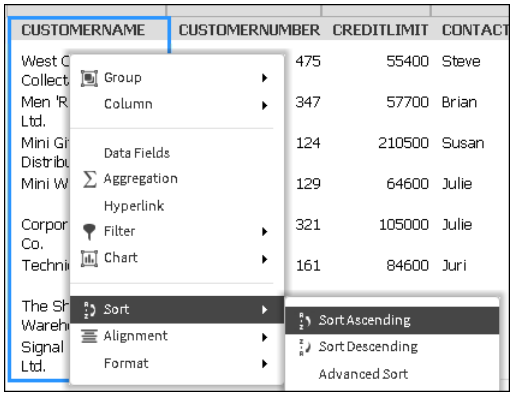


Figure 1-12 Selecting the sort option

The BIRT design displays data arranged alphabetically by customer name.

Task 6: Formatting the BIRT document

In this task, you edit column labels and the report title. You hide visible report elements that you do not want to display in your BIRT design. When you create a new report from a template, all items in the template appear by default in the report. If you do not want an item, such as a report-generation date or a label to appear in the report, you can hide the item. You also change the page layout to better fit the data in your report by using the following techniques:

- Changing the layout type, page size, and orientation
- Adjusting the widths of the columns

You also improve the presentation of the report by creating a new computed column to show the Contact first name and last name in a single column, formatting the Credit Limit column as currency in US dollars ($) and applying a custom string format to values in the Phone column.

How to edit a column label

1. Double-click the CUSTOMERNAME column label. Then, select the label and press Delete.
2. Type:

   ```
   Customer Name
   ```

   Then, press Enter.
3. Similarly, change the CUSTOMERNUMBER column label to Customer ID, CREDITLIMIT label to Credit Limit, PHONE label to Phone, the ADDRESSLINE1 label to Address, the CITY label to City, the STATE label to State, and the POSTALCODE label to Zip Code.

How to create a report title

1. Double-click the report title place holder. Then, select Double-click to Add a Report Title and press Delete.
2. Type:

   ```
   Customer directory
   ```

   Then, press Enter.

The BIRT design now looks like the one shown in Figure 1-13.

Customer Name	Customer ID	Credit Limit	CONTACTFIRSTNAME	CONTACTLASTNAME	Phone	Address	City	State	Zip Code
Boards & Toys Co.	219	11000	Mary	Young	3105552373	4097 Douglas Av.	Glendale	CA	92561
Collectable Mini Designs Co.	239	105000	Valarie	Thompson	7605558146	361 Furth Circle	San Diego	CA	91217
Corporate Gift Ideas Co.	321	105000	Julie	Brown	6505551386	7734 Strong St.	San Francisco	CA	94217
Men 'R' US Retailers, Ltd.	347	57700	Brian	Chandler	2155554369	6047 Douglas Av.	Los Angeles	CA	91003
Mini Gifts Distributors Ltd.	124	210500	Susan	Nelson	4155551450	5677 Strong St.	San Rafael	CA	97562
Mini Wheels Co.	129	64600	Julie	Murphy	6505555787	5557 North Pendale Street	San Francisco	CA	94217

Figure 1-13 Modifying column labels and the report title

How to select the items to hide or display

In this task, you hide the optional table header in the BIRT design.

Choose View➛Hide Table Header, as shown in Figure 1-14. To hide additional editable items in the template, select the item from the list.

Figure 1-14 Report items included in a template

To select the items to display in the report, in the View menu, select each item to display from the list that appears.

How to set the layout type, page size, and orientation

1 Choose File➛Page Setup, as shown in Figure 1-15.

Figure 1-15 Selecting the Page Setup option

2 Set the following options, as shown in Figure 1-16:

1. In Orientation, select Landscape, to accommodate the selected data columns on a standard page. When you choose Auto, Report Studio sets the page orientation depending on whether the report is longer or wider.
2. In Layout Preference, select Fixed Width to set the page width and precise column widths yourself. You use the Auto Expand Width option to allow Report Studio to set column widths based on the other page options you select and on the number of columns in the table.
3. In Paper Size, if necessary, select US Letter.
4. In Margin, if necessary, set the size value to 0.5 inch, in Top, Bottom, Left, and Right.

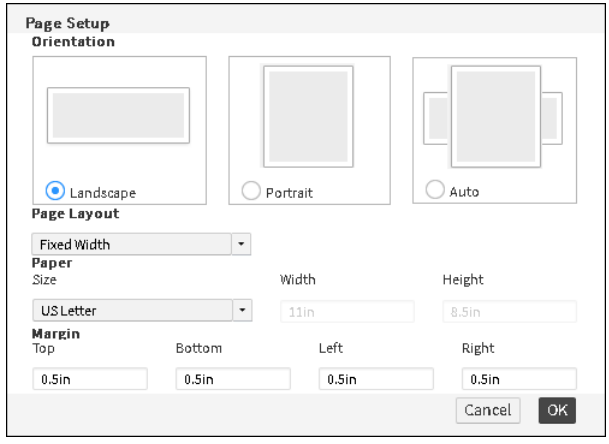


Figure 1-16 Specifying page setup options

Choose OK.

How to set column widths

If you want to control precisely the widths of columns in a table, first set the Layout Preference property in Page Setup to Fixed Width. The option to set a column's width is not available if the layout type is Auto Expand Width.

1. Select and right-click the Customer Name column, then choose Column➛Column Width.
2. In Column Properties, as shown in Figure 1-17, in Column Width, type:

   ```
   1.5
   ```

3. In the next field, if necessary, select inches.

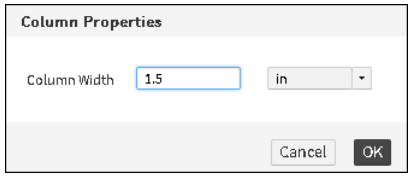


Figure 1-17 Setting a column's width using Column Properties

Choose OK.

How to display first and last names in the same column

In this task, you create a computed column that concatenates values in two columns in a report design.

1. Select and right-click the CONTACTFIRSTNAME column. Choose Column➛New Computed Column.
2. Calculation appears. In Calculation, perform the following tasks:
   1. In Column Label, type:

      ```
      Contact
      ```

   2. In Enter Expression, type [. Then, select CONTACTFIRSTNAME from the list that appears.
   3. Type an ampersand (&), followed by a space enclosed in double quotation marks (" "), followed by another ampersand (&), and a left bracket ([).
   4. Select CONTACTLASTNAME from the list that appears. The final expression looks similar to the following one:

      ```
      [CONTACTFIRSTNAME]&" "&[CONTACTLASTNAME]
      ```

   5. Choose Validate to verify that there are no syntax errors in the expression. After a confirmation message appears, as shown in Figure 1-18, choose OK.

   The Contact column appears in the report design.

3 In the BIRT design, press Ctrl and select the CONTACTFIRSTNAME and CONTACTLASTNAME columns. Choose Delete. The columns no longer appear in the BIRT design.

Figure 1-18 Creating a new column displaying contact first and last names

How to format currency values

In this task, you format numeric data as currency in US dollars, with two decimal places.

1 Select and right-click the Credit Limit column. Choose Format➛Format Data.

2 Number Column Format appears. In Number Column Format, perform the following tasks, as shown in Figure 1-19:

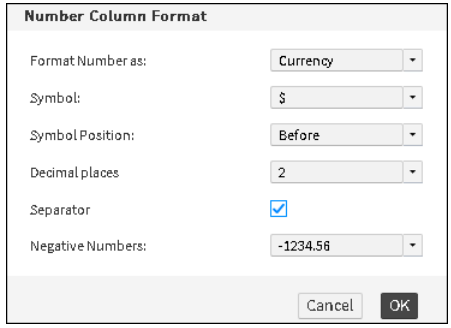


Figure 1-19 Formatting currency values

1. In Format Number as, choose Currency from the list.
2. Accept the default selection for each field listed in Table 1-1.

Table 1-1 Default selections for number column format

Field	Default selection
Symbol	$
Symbol Position	Before
Separator	Selected
Negative Numbers	-1234.56

3. In Decimal places, select 2 from the list.

How to format a data string

You format string data as telephone numbers using a custom format code.

1 Select and right-click the Phone column. Choose Format➛Format Data.

2 String Column Format appears. Complete the following steps:

1. In Format String as, select Custom.
2. In Format Code, as shown in Figure 1-20, type:

```
(@@@) @@@-@@@@
```

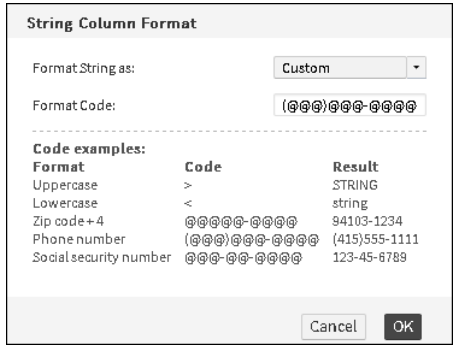


Figure 1-20 Specifying a custom format pattern

Choose OK. All telephone numbers in the report design are formatted based on the specified format code.

3 Set the width of the Phone column to 1.25 inches to accommodate each phone number on a single row.

The BIRT design displays the formatted data columns, as shown in Figure 1-21.

Customer Name	Customer ID	Credit Limit	Contact	Phone	Address	City	State	Zip Code
Boards & Toys Co.	219	$11,000.00	Mary Young	(310) 555-2373	4097 Douglas Av.	Glendale	CA	92561
Collectable Mini Designs Co.	239	$105,000.00	Valarie Thompson	(760) 555-8146	361 Furth Circle	San Diego	CA	91217
Corporate Gift Ideas Co.	321	$105,000.00	Julie Brown	(650) 555-1386	7734 Strong St.	San Francisco	CA	94217
Men 'R' US Retailers, Ltd.	347	$57,700.00	Brian Chandler	(215) 555-4369	6047 Douglas Av.	Los Angeles	CA	91003
Mini Gifts Distributors Ltd.	124	$210,500.00	Susan Nelson	(415) 555-1450	5677 Strong St.	San Rafael	CA	97562
Mini Wheels Co.	129	$64,600.00	Julie Murphy	(650) 555-5787	5557 North Pendale Street	San Francisco	CA	94217
Signal Collectibles Ltd.	487	$60,300.00	Sue Taylor	(415) 555-4312	2793 Furth Circle	Brisbane	CA	94217
Signal Gift Stores	112	$71,800.00	Jean King	(702) 555-1838	8489 Strong St.	Las Vegas	NV	83030
Technics Stores Inc.	161	$84,600.00	Juri Hashimoto	(650) 555-6809	9408 Furth Circle	Burlingame	CA	94217
The Sharp Gifts Warehouse	450	$77,600.00	Sue Frick	(408) 555-3659	3086 Ingle Ln.	San Jose	CA	94217
Toys4GrownUps.com	205	$90,700.00	Julie Young	(626) 555-7265	78934 Hillside Dr.	Pasadena	CA	90003
West Coast Collectables Co.	475	$55,400.00	Steve Thompson	(310) 555-3722	3675 Furth Circle	Burbank	CA	94019

Figure 1-21 Examining a formatted BIRT design

Task 7: Saving and viewing a BIRT design

You save a BIRT design to the home folder of your user account in the iHub volume. Your access privileges determine the folders in which you can save a report. Once the BIRT design is saved, Actuate Viewer displays the report with actual data.

How to save and view a BIRT design

1 Choose Save and View. The first time you save a BIRT design, Save As appears, as shown in Figure 1-22. This dialog box typically displays your user's home folder.

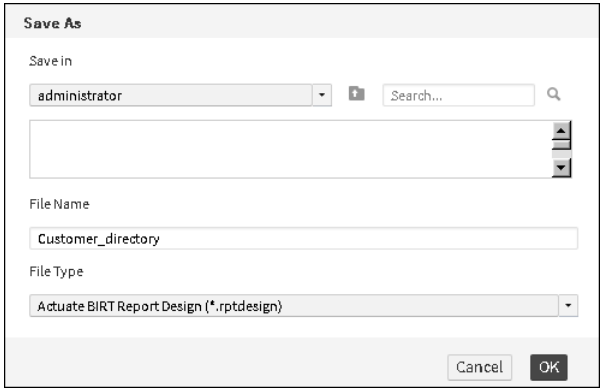


Figure 1-22 Saving a report design

2 If necessary, navigate through the folder structure to select a different folder.

3 If you know the name of the existing file you want to overwrite, type the name or relevant keywords in Find. Then, press Enter, or choose Find. Save Report Design displays the reports that match the string you provided.

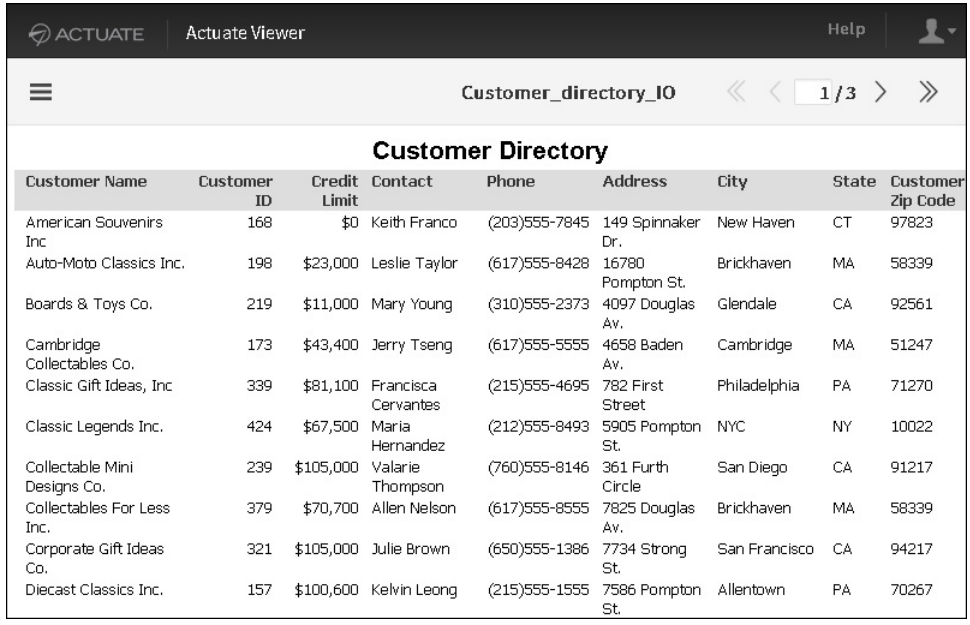
4 In File Name, type:

```
Customer_directory
```

The file name can contain alphanumeric characters and spaces, but it cannot contain punctuation.

File Type shows that the report is saved as an Actuate BIRT report design file with a .rptdesign file-name extension. Choose OK.

Actuate Viewer generates and displays the report, as shown in Figure 1-23.



Customer Directory

Customer Name	Customer ID	Credit Limit	Contact	Phone	Address	City	State	Customer Zip Code
American Souvenirs Inc	168	$0	Keith Franco	(203)555-7845	149 Spinnaker Dr.	New Haven	CT	97823
Auto-Moto Classics Inc.	198	$23,000	Leslie Taylor	(617)555-8428	16780 Pompton St.	Brickhaven	MA	58339
Boards & Toys Co.	219	$11,000	Mary Young	(310)555-2373	4097 Douglas Av.	Glendale	CA	92561
Cambridge Collectables Co.	173	$43,400	Jerry Tseng	(617)555-5555	4658 Baden Av.	Cambridge	MA	51247
Classic Gift Ideas, Inc	339	$81,100	Francisca Cervantes	(215)555-4695	782 First Street	Philadelphia	PA	71270
Classic Legends Inc.	424	$67,500	Maria Hernandez	(212)555-8493	5905 Pompton St.	NYC	NY	10022
Collectable Mini Designs Co.	239	$105,000	Valarie Thompson	(760)555-8146	361 Furth Circle	San Diego	CA	91217
Collectables For Less Inc.	379	$70,700	Allen Nelson	(617)555-8555	7825 Douglas Av.	Brickhaven	MA	58339
Corporate Gift Ideas Co.	321	$105,000	Julie Brown	(650)555-1386	7734 Strong St.	San Francisco	CA	94217
Diecast Classics Inc.	157	$100,600	Kelvin Leong	(215)555-1555	7586 Pompton St.	Allentown	PA	70267

Figure 1-23 Actuate Viewer displaying a completed BIRT design

Part Two

Accessing data

Chapter

2

Providing data to a BIRT design

This chapter contains the following topics:

- About providing data to a BIRT design
- Using a template
- Using a theme
- Introducing data sources
- Selecting a data source

About providing data to a BIRT design

Report Studio accesses data for BIRT designs from a variety of data sources, including databases, text files, and XML documents such as other BIRT design or document files. Every report you create in Report Studio is based on a template. A theme in a template helps you personalize, your BIRT design to show a particular background and custom color and font settings for various elements. Report developers provide templates and themes that enable reports to have a consistent appearance across functions in an organization. The following chapter describes the primary sources Report Studio uses to access data and present it in a report.

Using a template

In addition to determining the basic layout of your report and the items available in the BIRT design, a template also defines the style of a report—the color schemes, fonts, spacing, alignment, page size, and other presentation aspects. A template also can provide sets of styles called themes, which you use to change the appearance of a report with one click.

Your Report Studio installation can provide custom templates designed for the types of reports you need to create, grouped by category. Templates can be organized by report type or by department, for example. Your access privileges determine which categories and templates you can view and use. Figure 2-1 identifies the items a template typically includes. All templates contain at least one empty table as a placeholder for data.

Figure 2-1 Items in a typical template

How to select a template for your report

1 When you create a new report, Report Studio displays Report Template. In Report Template, in Category, select a template category.

Figure 2-2 shows thumbnail images of sample templates in the Standard category included in the default installation of Report Studio.

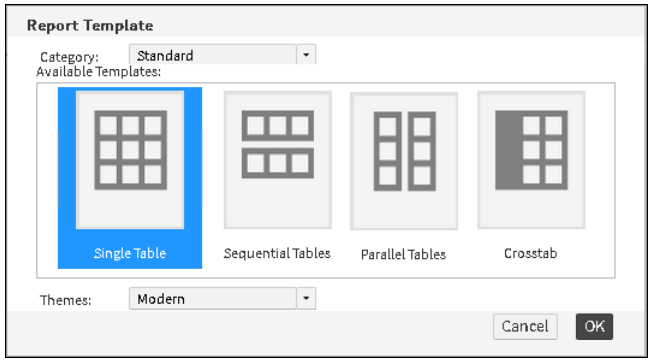


Figure 2-2 Selecting a report template

2 In Available Templates, select a template based on the type of BIRT design you want to create. Place your cursor over the thumbnail image of the template to view its description.

3 In Themes, if necessary, select the Modern theme for your BIRT design.

Choose OK.

Using a theme

A template theme can determine the colors used in the report, such as the background color for column headers or data rows, the font used for specific report items, the spacing between rows, the styles of borders, text alignment, and more. Themes are optional. A template can include multiple themes to provide users with different style options for a report. Report Studio provides predefined themes you can use to customize the appearance of your BIRT design.

How to modify a theme

1 Choose Format➛Themes. If the template includes themes, a list of available themes appears. Figure 2-3 shows the themes included in the single table template.

Figure 2-3 Themes included in the single table template

2 Select a theme to apply. The BIRT design reflects the style properties for the theme.

Introducing data sources

After you select a template, you select a data source from a list of available sources. Depending on your system configuration, the data source can be one of the following:

- A data set included in the selected template
- An information object, if access to this option is enabled by your system administrator
- A data object

These data sources contain all the information to connect to a data repository, such as a database, and retrieve a specific set of data.

Working with data sets

Data sets in templates, information objects, and data objects provide easy access to the data fields that contain the data for a report. For example, a data object or a data set named CustomerData can contain customer information fields, such as customer name, address, phone number, and so on. You choose this data set to create a report that lists customers and their contact information.

BIRT data objects and information objects are made up of data sets and sometimes cubes. Data sets classify data fields retrieved from the data source in dimensions, measures, and attributes. These analysis types are specified at the time of designing the information object or data object, and cannot be modified using Report Studio. It is useful to understand these analysis types to use them appropriately in a BIRT design.

Dimensions are data fields that group other data fields. Each dimension field can contain multiple attributes. Attributes are typically associated with a dimension. Table 2-1 lists the possible attributes for each dimension field.

Table 2-1 Dimensions with associated attribute fields

Dimension	Attribute fields
Product Line	Product name, product code
Region	Country, state, city

Measures are data fields that can be aggregated or computed, such as revenue, profit, price, and so on.

A data object can also contain a BIRT data model comprising one or more linked data sets. You can use a data model in the same way that you use a data set. Additionally, you can use a data model to create a cross tab design. BIRT data models are located alongside cubes in a data object. Query optimization in a data

model offers better performance than a cube. A data model also provides you with more flexibility in your choice of dimensions and measures.

Working with cubes

A cube is a multidimensional data structure that is optimized for analysis and reporting. A cube can exist as part of a data object that contains at least one data set. A BIRT data object can contain many data sets and many cubes. In Report Studio, you use a cube to create a cross tab design.

A cube organizes data into dimensions and measures as follows:

- Measures represent values that are counted or aggregated, such as costs or units of products.
- Dimensions are categories, such as products, customers, or sales periods, used to aggregate measures. Dimensions can be hierarchical and contain multiple levels. For example, a region dimension can contain a region-country-state hierarchy. Similarly, a time dimension can contain a year-quarter-month-week hierarchy. Most cubes include a time dimension because, for most reports, showing measures by day, week, month, quarter, or year is essential to analyzing data.

Working with information objects and BIRT data objects

An information object is a named SQL query that can retrieve data from one or more data sources. A BIRT data object is a collection of data sets, linked data sets called data models, and cubes that can be used to create BIRT reports. A data object must contain at least one data set but does not need to contain a cube. Report developers use Actuate BIRT Designer Professional to create data objects and information objects. In BIRT iHub and later releases, access to information objects is not provided by default, and must be enabled in the Report Studio configuration file. Information objects are not supported in BIRT iHub F-Type.

A report accesses data from a data object using either a data design (.datadesign) file or a data object store (.data) file. The data design file retrieves data, on demand, each time the report is run. A data object store contains cached, or materialized, data. If getting real-time data is more important than report generation speed, use the data object design file. If data in the underlying data source does not change constantly, or if a data object store is generated regularly, use the data object store.

Report Studio provides a convenient Table Builder wizard that enables you select data fields from information objects or data objects and insert them into a BIRT design.

Limiting the data retrieved from the data source

You can limit the data available to a BIRT design by applying filters to a data set in a template, an information object, or a data object, using Table Builder in Report Studio. Both information objects and data objects can contain very large amounts of data. Using filters to limit the data available to a BIRT design is useful when you need to create a report that displays specific data quickly.

Selecting a data source

The following section describes how to select a data source. The procedure for selecting the data source for your report depends on the template you select. If you select a template that does not include a data set, Report Studio prompts you to select an information object or a data object stored in the iHub volume. If you choose a cross tab template, you must select a data object that contains a cube or a data model.

How to select a template that includes one or more data sets

1 In Report Template, select a template that includes one or more data sets. Choose OK. Data appears, as shown in Figure 2-4.

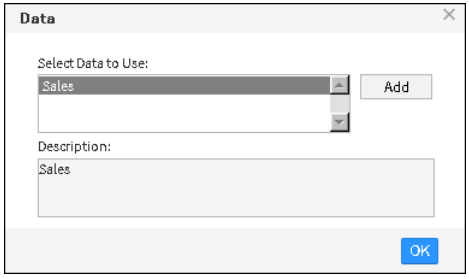


Figure 2-4 Selecting a data set

Data displays the data sets included in the template.

2 Select a data set, then choose OK.

Table Builder appears listing the data fields in the selected data set. Use Table Builder to select and insert data fields in a BIRT design.

How to select an information object

This procedure assumes that the option to access information objects has been enabled in the Report Studio configuration file.

1 In Report Template, select a template that does not contain a data set. Choose OK. Data Source appears.

2 In Data Source, select Information Objects, as shown in Figure 2-5. Then, choose OK.

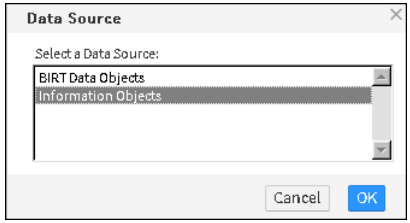


Figure 2-5 Selecting an information object data source

3 Select Information Object appears. Navigate to the folder that contains the information object to use. An information object has a .iob file-name extension. Select the information object, as shown in Figure 2-6. Then, choose OK.

Table Builder appears listing the data fields in the selected data set. You use Table Builder to select and insert data fields in a BIRT design.

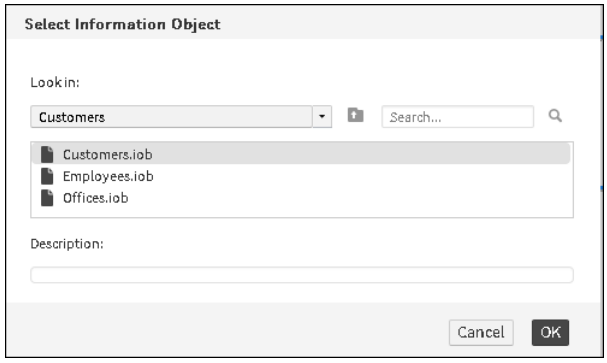


Figure 2-6 Selecting an information object

How to select a data object

1 In Report Template, select a template that contains no data set. Choose OK.

2 In Data Source, as shown in Figure 2-7, select BIRT Data Objects. Then, choose OK.

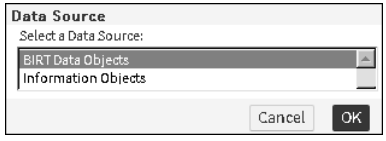


Figure 2-7 Selecting a data object

Select Data appears, as shown in Figure 2-8.

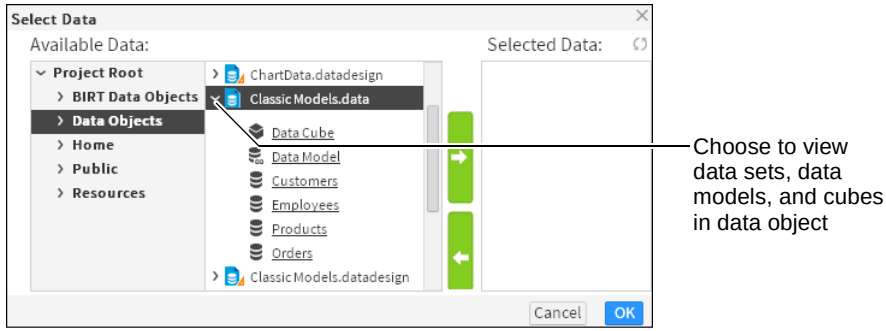


Figure 2-8 Selecting a data object

3 In Available Data, select a data object design (.datadesign) file to retrieve current data on demand, or a data object store (.data) file to use cached data.

To view the data sets and cubes in each data object, select the arrow next to the data object file name, as shown in Figure 2-8.

- Available Data displays the data sets and cubes in the selected data object, as shown in Figure 2-8.
- Select the cube to view the data fields it contains.
- Select a data model to view the data fields it contains.
- Select a data set to view the data fields it contains.

4 In Select Data, in Available Data, select the data object design file or data object store file, then choose the right arrow.

The selected file appears in Selected Data, as shown in Figure 2-9.

To select a different data object, in Selected Data, select the data object and select the left arrow. Then, repeat step 4. Choose OK.

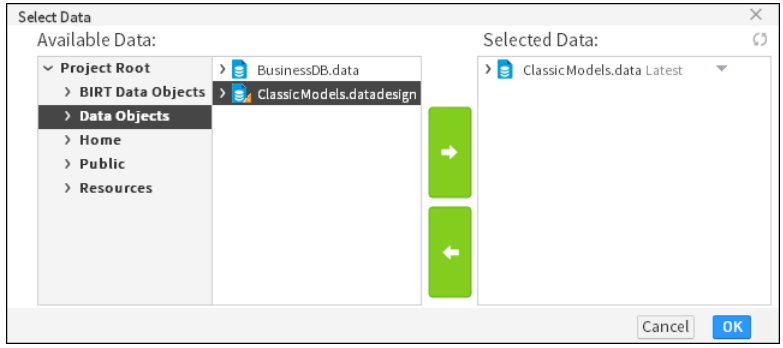


Figure 2-9 Current Data Selection displaying the chosen data object

5 In Select Data Set, shown in Figure 2-10, select a data set or data model to use.

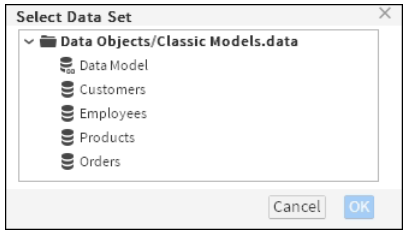


Figure 2-10 Selecting a data set

Choose OK.

Table Builder appears listing the data fields in the selected data set or data model. Use Table Builder to select and insert data fields in a BIRT design.

How to select a new data set

1 In Report Studio, choose Modify in the left navigation pane, as shown in Figure 2-11.

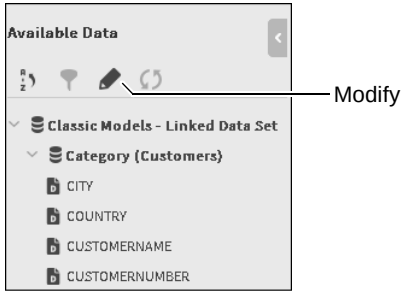


Figure 2-11 Choosing Modify

Select Data Set appears displaying the data set currently in use, and the data sets in the data object you selected earlier.

2 Select a new data set from the list of available data sets. Then, choose OK.

Table Builder appears, displaying the data fields in the data set you selected.

3 Double-click each field to add it to the report table.

Chapter

3

Combining data from multiple sources

This chapter contains the following topics:

- Requirements for using multiple information objects
- Joining information objects
- Getting current data from a data source

Requirements for using multiple information objects

For usability and performance reasons, a data administrator can organize data in a suite of information objects rather than in a single information object. For example, rather than include all customer data and order data in a single information object, the data can be organized in two information objects; one information object retrieves customer data, and another information object retrieves order data. To create a BIRT design that displays order data for every customer, you need data from both information objects.

In Report Studio, you can use data from two or more information objects if you have access to the multiple information objects that can be combined. Make sure that you, or the user group you belong to, have been assigned Visible and Read permissions to the folder containing the information objects. In BIRT iHub and later releases, access to information objects is not provided by default, and must be enabled in the Report Studio configuration file.

In addition, you should have knowledge of the following:

- The principles of combining, or joining, database tables. To use data from two or more information objects, you join information objects in a similar manner.
- The structure and the relationship among the information objects whose data you want to join.

You can join information objects only. You cannot join data sets in a template, or those in a data object using Report Studio, but you can use data from a linked data set in a BIRT data object, created in BIRT Designer Professional.

Joining information objects

Joining information objects is similar to joining tables in a database. As in a table join, you join information objects through a common field. For example, suppose one information object retrieves customer data, such as name, customer ID, address, phone, and credit limit. Another information object retrieves order data, such as order number, order date, ship date, status, and customer ID. Both information objects include a customer ID field, which you use to join the information objects.

You can retrieve data from any number of information objects as long as there is a relationship, identified by common fields, among the information objects. Figure 3-1 shows three information objects and the fields that join them. The Customer IO is joined to the Orders IO through the customerNumber field, and the Orders IO is joined to the OrderDetails IO through the orderNumber field.

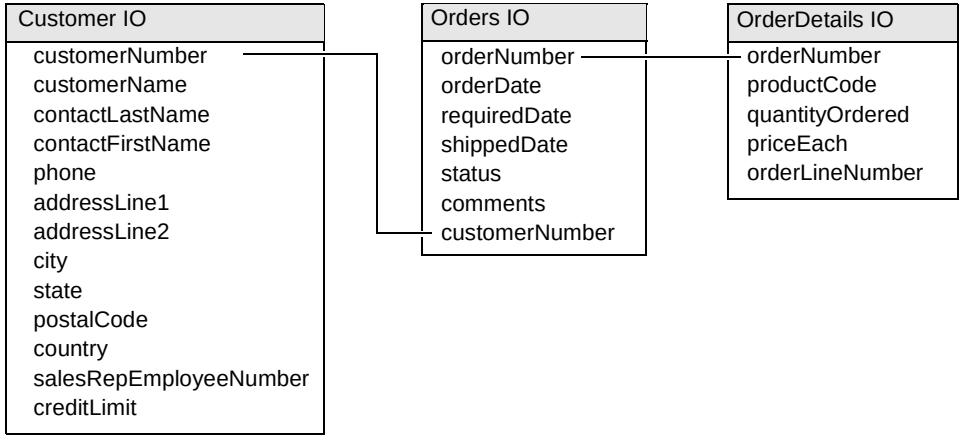


Figure 3-1 Joining information objects through common fields

How to join information objects

This procedure assumes you have created a new BIRT design and selected an information object data source.

1 In Available Data, choose Modify, as shown in Figure 3-2. This figure also shows an example of Available Data displaying the data fields in the first information object, Customers.

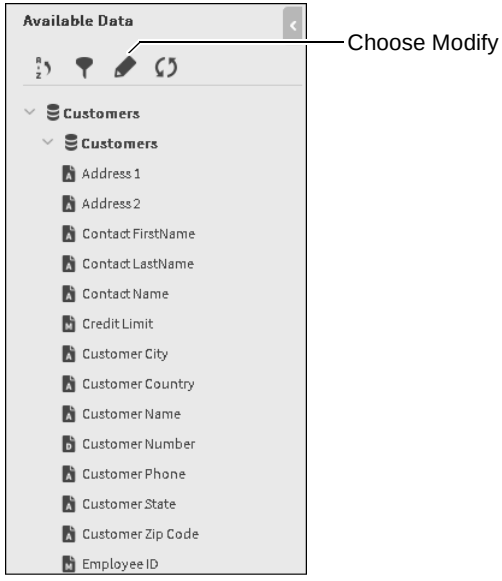


Figure 3-2 Choosing Modify in Available Data

Join displays the information object, Customers, under List of Information Objects, as shown in Figure 3-3.

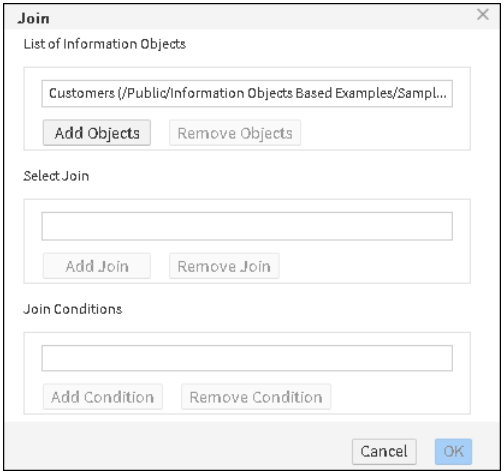


Figure 3-3 Join displaying the current information object used in the BIRT design

2 Select a second information object to join to the first information object:

1 Choose Add Objects.

2 On Select Information Object, browse through the folders to find and select an information object. Figure 3-4 shows an example of Select Information Object displaying the contents of a folder, which includes two information objects.

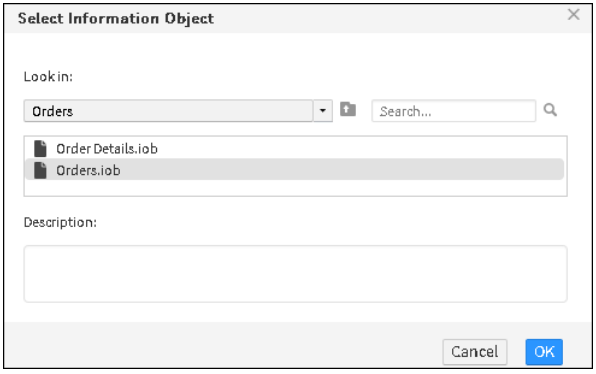


Figure 3-4 Select Information Object displaying the contents of a folder

3 Choose OK. The second information object appears in List of Information Objects on Join.

3 Join the information objects:

1 On Join, in Select Join, choose Add Join. Add Join displays two fields, Left and Right, which contain the names of the information objects.

2 In Left, select one information object. Then, in Right, select the other information object. Figure 3-5 shows an example where CustomerData and OrderData are selected in the Left and Right fields, respectively.

Figure 3-5 Using Add Join to select two information objects to join

3 Choose OK. Select Join displays the information objects selected for the join, as shown in Figure 3-6.

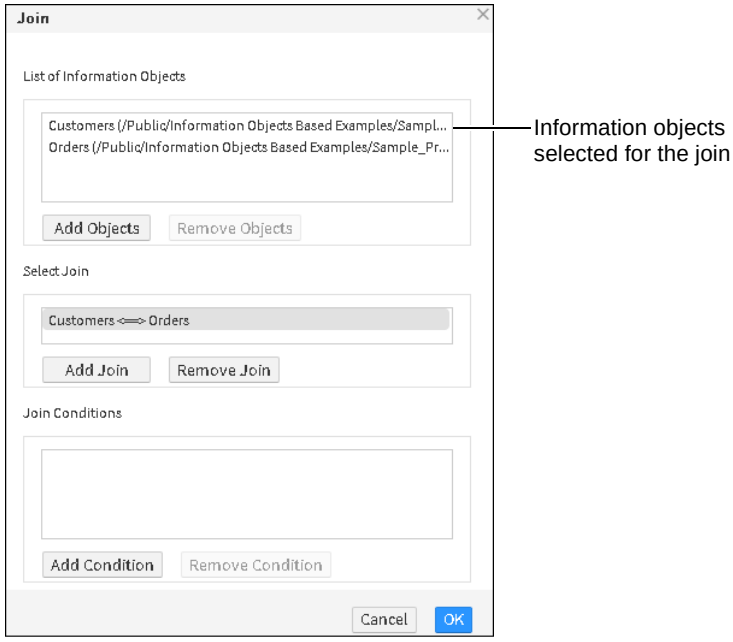


Figure 3-6 Examining the information objects selected for the join

4 Specify the join condition:

1 In Join, in Join Conditions, choose Add Condition.

Add Join Condition lists all the fields in the first and second information objects.

2 In Left, select a field. In Right, select a field that contains the same data. The two fields do not have to have identical names, but they must have the same data type.

3 In Condition, select a comparison operator. Typically, you use the default operator, equal to. Figure 3-7 shows an example of a completed join condition. The join condition joins the information objects on their respective customerNumber fields. This condition retrieves only those rows in which the customerNumber values match.

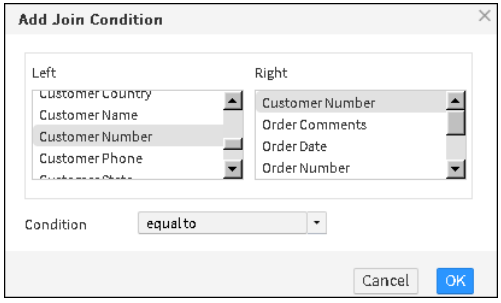


Figure 3-7 Adding a join condition

4 Choose OK. Join Conditions displays the specified join condition, as shown in Figure 3-8.

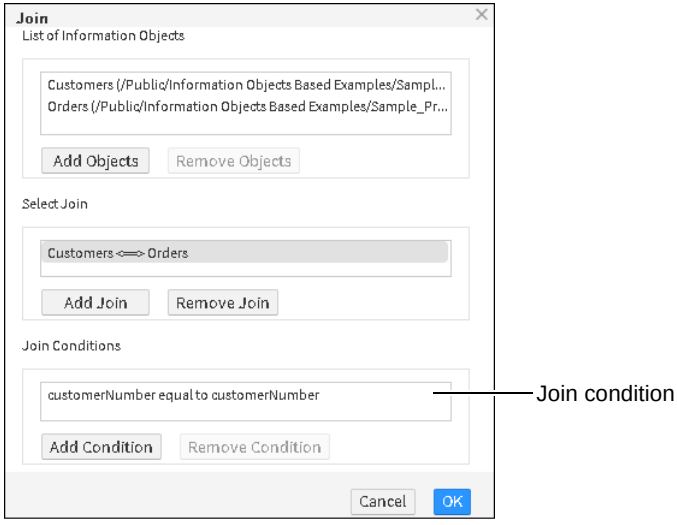


Figure 3-8 Examining the completed join

You have finished joining two information objects.

5 Repeat the previous steps to add and join additional information objects. Choose OK when you finish joining the information objects.

Available Data displays all the data fields from the joined information objects that you can insert in a table in your BIRT design. In Figure 3-9, Available Data shows the data fields in two information objects, CustomerData and OrderData.

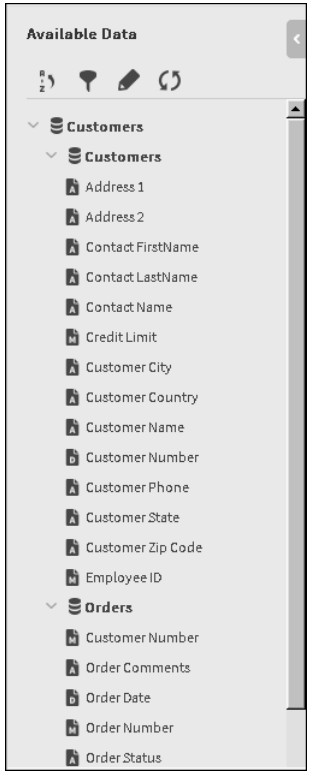


Figure 3-9 Examining the fields of two joined information objects

Getting current data from a data source

When you select an information object or data object, Report Studio makes the data fields in the information object or data object available to your BIRT design. The information object or data object remains on the server and can be modified after you design your BIRT design. For example, a data administrator can add or remove fields from an information object or data object. This section describes how to make sure the data displayed in your BIRT design is current.

Refreshing data in an information object

To ensure that your BIRT design uses current data from an information object, you can synchronize your data set with the data set in the modified information object. To synchronize a data set, you must have an advanced user role.

How to synchronize data sets

In Available Data, choose Synchronize Data Sets, as shown in Figure 3-10. If a new field has been added to the information object, the new field appears in the list. If a field is removed from the information object, the field is removed from the list. If your BIRT design uses a field that is no longer available, Report Studio displays an error message. To fix it, delete the column from the BIRT design.

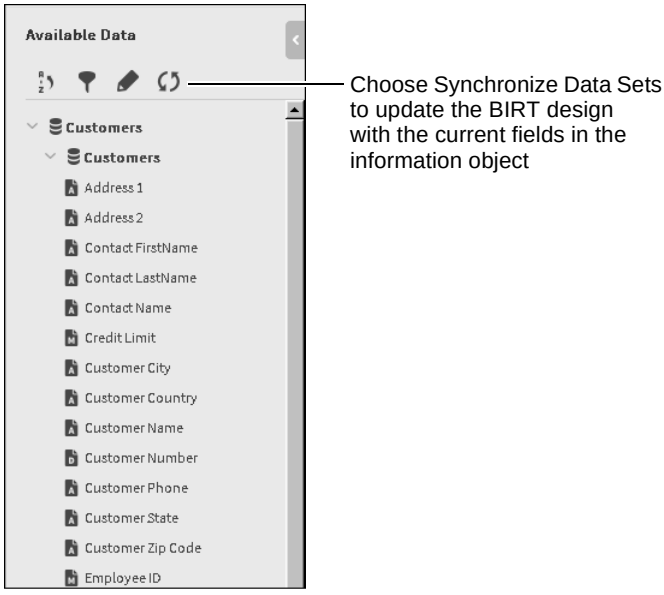


Figure 3-10 Synchronizing data sets to update the list of fields

Refreshing data in a data object

You can also refresh data in a modified data object so that the BIRT design uses the most current data. Choose Manage Data. In Select Data, choose Refresh to retrieve the most recent data from a data object store or cube. The current data fields appear in Available Data in Report Studio.

If you select Refresh when you create a new BIRT design that uses a data object store, nothing happens because you have selected a new data object store file, and there are no existing data fields in the table that Report Studio can refresh.

Part Three

Building BIRT application components

Chapter

4

Working with summary tables

This chapter contains the following topics:

- About summary tables
- Creating a summary table
- Modifying a summary table
- Inserting a chart in a summary table
- Changing table types

About summary tables

A summary table presents aggregate data information in a report, providing users with a concise view of the data. The aggregate calculation occurs at the data source level, which enables users to quickly view summary information at a glance, improving response time and reducing the load on the server.

For example, from a data source that contains two fields—Order Status and Amount—using a summary table, the user can view the total amount for each status. Report Studio calculates the sum of the Amount field at the data source level, and presents the corresponding values in the BIRT design. This section describes how you can use Report Studio to create and modify a summary table.

Understanding columns in a summary table

In a summary table dimension columns group data in other columns. Some examples of dimension columns include order date, country, state, or product line. Dimension columns containing date-and-time data can be grouped in intervals, in a summary table. Measure columns contain the aggregated values that are evaluated. Depending on the type of data in a measure column, Report Studio makes available specific aggregate functions to use on the column. Some examples of measure columns include quantity ordered, profit, and revenue. Columns that provide additional information about a dimension field are called attribute columns. For example, a product name or product code data field can be attributes of the Product Line dimension. Each dimension can contain several attribute fields.

Designing a summary table

When you design a summary table, first evaluate which dimension, attribute, and measure columns you need, based on the aggregate data you want to display. In the example shown in Figure 4-1, data in the measure columns is grouped by the dimension, and displays subtotals in the group footer. Although there are two dimension columns in the example in Figure 4-1, the outermost one groups data in the other columns. The Product Name field is an attribute of the Product Line dimension. You can perform multiple aggregate calculations for data in a single measure column. A grand total is displayed in the report table footer.

Although each attribute column must be associated with a dimension column for it to be useful in a summary table, you do not need a dimension column to create a meaningful summary table. The example shown in Figure 4-2 displays order totals, the measure column, for each state, an attribute column, and a grand total for all states.

The example shown in Figure 4-3 displays the grand total for two peer attribute columns and a measure column. Product code and Product name are peer attribute fields of the Product Line dimension field.

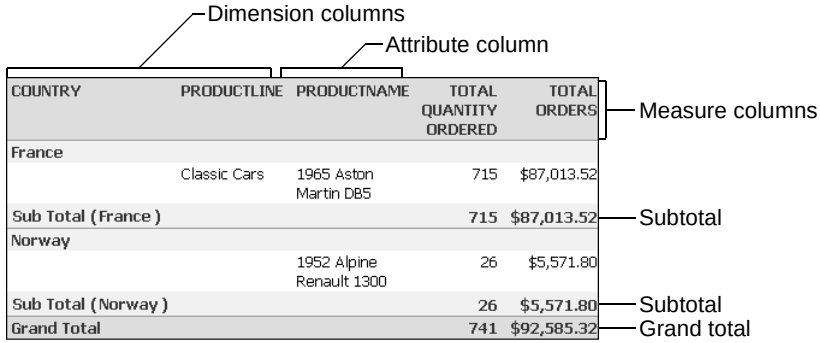


Figure 4-1 Example of a summary table

STATE	ORDER TOTALS
CA	$25,550.28
NV	$10,432.28
Victoria	$15,125.30
Grand Total	$51,107.86

Figure 4-2 Summary table without groups displaying the grand total

PRODUCTNAME	PRODUCTCODE	SUM (QUANTITYORDERED)
1965 Aston Martin DB5	S18_1589	7171
Grand Total		7171

Figure 4-3 Grand totals displayed for attribute columns

Because the example uses peer attribute columns, and the summary table does not contain the dimension field they are associated with, data is not grouped and subtotals are not displayed.

Creating a summary table

The following section describes how to create a summary table in Report Studio. You use Table Builder to select the data fields for the summary table, and specify the order of appearance of the selected fields. Using Table Builder, you can also specify the following information:

- Group date-and-time dimension columns by an interval.
- Select one or more aggregate functions to use for the measure columns.
- Optionally create a filter condition at the data set level on any dimension or attribute column to limit the data displayed in the summary table.

How to create a summary table

The process to create a summary table using a data set in a template, an information object, or a data object data source is the same. This section describes how to create a summary table using any of these data sources.

1. Launch Report Studio, select a template, then select a data source.
2. Table Builder appears. In Table Builder, complete the following steps:
    1. In Table Builder—Data, in Fields, select Summarize to create a summary table. Current Measure Selections is highlighted.
    2. In Fields, in Available Data:
        1. Press Ctrl and select each dimension and attribute data field to insert in the BIRT design. Then, choose the right arrow.
        2. Press Ctrl and select the measure fields to insert in the BIRT design. Then, choose the right arrow.

    The selected data fields, Order Date and Product Name, appear in Current Column Selections, as shown in Figure 4-4. The selected measure fields, Order Total and Quantity Ordered, appear in Current Measure Selections. Use the arrows to modify the order in which you want the selected fields to appear in the BIRT design.

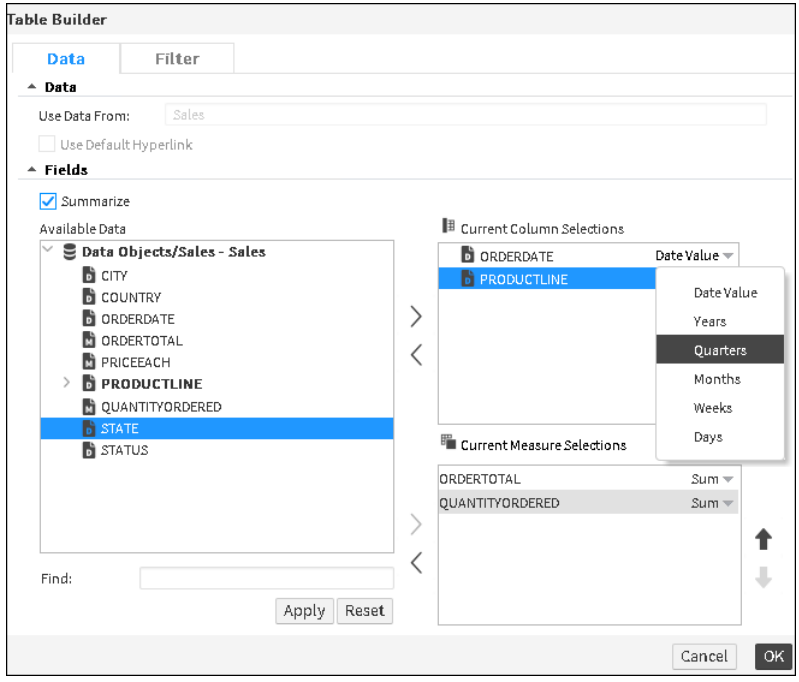


Figure 4-4 Grouping date dimension column in quarterly intervals

3 If the data source contains a large number of data fields, type the name of the field in Find, then choose Apply. If the data field is found, Table Builder displays the data field in Available Data. Select the data field, then choose the right arrow. The data field appears in Current Column Selections. Repeat this step to retrieve each additional data field for which you can supply a name.

4 For each selected dimension field containing date-and-time data, you can group the data in intervals. Select an available interval from the Date Value drop-down list. Figure 4-4 shows the Order Date field grouped in quarters.

5 For every measure field containing numeric or string data, select an aggregate function to apply from the drop-down list. For columns containing numeric data, the default aggregation function selected is Sum. To aggregate a measure field by an additional function, do the following:

   1 Select the field once again in Available Data. Then, choose the right arrow so that the measure field appears once again in Current Measure Selections.

   2 Use the menu to choose a new aggregate function to apply to the field. Figure 4-5 shows the Average function applied to the Quantity Ordered field.

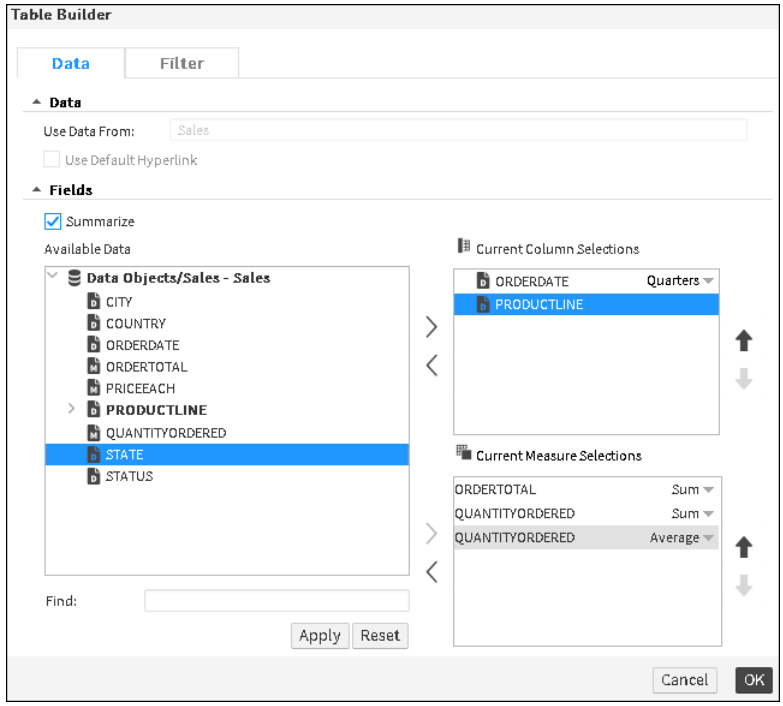


Figure 4-5 Aggregating measure columns

6 To limit the data displayed in the report, create a data set filter for dimension and attribute fields, in the same way you did for a detail table.

Choose OK. Report Studio displays the selected data fields in a summary table, as shown in Figure 4-6. You are now ready to modify the summary table.

ORDERDATE	PRODUCTLINE	SUM (ORDERTOTAL)	SUM (QUANTITYORDERED)	AVERAGE (QUANTITYORDERED)
Q1, 2011				
	Vintage Cars	2163.5	50	50
Sub Total (Q1, 2011)		2163.5	50	50
Q2, 2011				
		16902.4300000000001	254	36.285714285714285
Sub Total (Q2, 2011)		16902.4300000000001	254	36.285714285714285
Q3, 2011				
		11658.7499999999986	120	40
Sub Total (Q3, 2011)		11658.7499999999986	120	40
Q4, 2011				
		24781.400000000001	304	30.4
Sub Total (Q4, 2011)		24781.400000000001	304	30.4

Figure 4-6 Summary table BIRT design

Modifying a summary table

Using Report Studio, you can work with summary tables to format data, organize data in groups, sort data, create filters, and insert charts as you would for a detail table. This section describes the actions you can perform on dimension columns, attribute columns, measure columns, and each column header. Table 4-1 lists the actions you can perform on dimension columns, measure columns, attribute columns, column headers, and the entire report table.

Table 4-1 Modifying data in a summary table

Action	Dimension column	Attribute column	Measure column	Column header	Report table
Advanced filtering					✓
Advanced sorting	✓		✓		✓
Creating a new computed column			✓		
Creating aggregate data			✓		
Creating borders				✓	✓
Creating data set filters					✓

Table 4-1 Modifying data in a summary table

Action	Dimension column	Attribute column	Measure column	Column header	Report table
Creating filters	✓	✓	✓		✓
Creating groups	✓				
Creating hyperlinks	✓	✓	✓		
Creating page breaks before or after a group	✓				
Creating sections					
Deleting a group	✓				
Deleting the column	✓	✓	✓		
Disabling default hyperlinks					✓
Editing the column header text				✓	
Filtering top/bottom N			✓		
Formatting data	✓	✓	✓		
Grouping date-and-time data in intervals	✓				
Hiding a column					
Hiding details for a group	✓				
Inserting a chart		✓			✓
Reordering columns	✓	✓	✓		
Sorting column data	✓	✓	✓		✓
Specifying alignment properties	✓	✓	✓	✓	✓
Specifying column width	✓	✓	✓		
Specifying conditional formatting rules			✓		
Specifying font properties	✓	✓	✓	✓	✓

When creating filter conditions for a summary table that uses a data model in a BIRT data object as the data source, the following conditions apply:

- You cannot use Advanced Filter to filter data in a measure column.
- You cannot use Advanced Filter to filter data in dimension and attribute columns if the summary table already contains a measure column with a defined filter condition.
- You can use Advanced Filter to create filters for dimension and attribute columns in a summary table using a data model data source, if no filter condition is defined on a measure column.

Modifying the report table

You can perform the following actions at the report table level in a summary table:

- Insert a chart at the report table level.
- Hide a table, and display the corresponding chart.
- Sort data.
- Specify font properties.
- Specify alignment properties for column data.
- Format data types.
- Add a border for the table.
- Add data fields from the data set.
- Reorder columns.
- Create a bookmark to the summary table.

To add a table border, add data fields, insert a chart, reorder columns, or create a bookmark to the summary table, choose an option from the context menu of the report table, as shown in Figure 4-7.

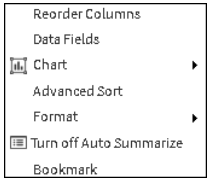


Figure 4-7 Modifying the report table using the context menu

Modifying labels

You can perform the following actions on a column header or an aggregate label in a summary table:

- Edit the header or label text.
- Modify the alignment of label text.
- Format font properties.
- Create a border for the label.

To modify a column header or an aggregation label, select the column header and choose an option from the context menu. The context menu appears, as shown in Figure 4-8.

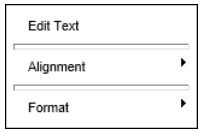


Figure 4-8 Modifying a column header using the context menu

Working with a dimension column

If a report has one or more dimension columns, the order in which you select and insert the columns determines the group level. For example, if you select and insert Product Line before Country, Product Line is a higher level, or outer group. Country is the lower level, or inner group. After you select the dimension columns, you can modify their order in Table Builder.

A grouped dimension column displays subtotals for the data in each group. When you group a dimension column, Report Studio eliminates duplicate data values when calculating aggregate data. Figure 4-9 displays a summary table containing three dimension columns. The Order Date column is grouped in quarterly intervals, and is located in the innermost position.

When a summary table contains more than one dimension column, data in the outer dimension columns can be grouped, as shown in Figure 4-9, and subtotals are displayed for each value in the grouped column.

COUNTRY	PRODUCTLINE	ORDERDATE	SUM (QUANTITYORDERED)	SUM (ORDERTOTAL)
Denmark				
	Classic Cars			
		Q4, 2011	63	$6,041.52
		Q2, 2012	22	$1,494.02
	Sub Total (Classic Cars)		85	$7,535.54
Sub Total (Denmark)			85	$7,535.54

Innermost grouped date dimension

Figure 4-9 Grouping the innermost date-and-time dimension column

When working with a dimension column that contains date-and-time data, you can group the data by intervals such as day, week, month, quarter, or year. When placed in the innermost position, dimension columns that contain other types of data cannot be grouped, as shown in Figure 4-10. If a dimension column contains date-and-time data, you can always group data in the column by intervals.

COUNTRY	ORDERDATE	PRODUCTLINE	SUM (QUANTITYORDERED)	SUM (ORDERTOTAL)
Denmark				
	Q4, 2011			
		Classic Cars	63	$6,041.52
	Sub Total (Q4, 2011)		63	$6,041.52
	Q2, 2012			
			22	$1,494.02
	Sub Total (Q2, 2012)		22	$1,494.02
Sub Total (Denmark)			85	$7,535.54

Innermost ungrouped dimension

Figure 4-10 Grouping dimension columns

The innermost dimension column does not display subtotals, irrespective of the type of data in the column, as shown in Figure 4-9 and Figure 4-10.

For a summary table containing a single dimension column, and one or more associated attribute columns, you cannot group data in the dimension column. No subtotals appear. The summary table displays a grand total value for all product lines, as shown in Figure 4-11.

PRODUCTLINE	PRODUCTNAME	SUM (ORDERTOTAL)
Classic Cars	1965 Aston Martin DB5	$222,731.02
Grand Total		$222,731.02

Figure 4-11 A summary table displaying a grand total

The preceding summary table results from the data object, as shown in Figure 4-12, which contains the Product Line dimension and two associated attribute fields, Product Code and Product Name.

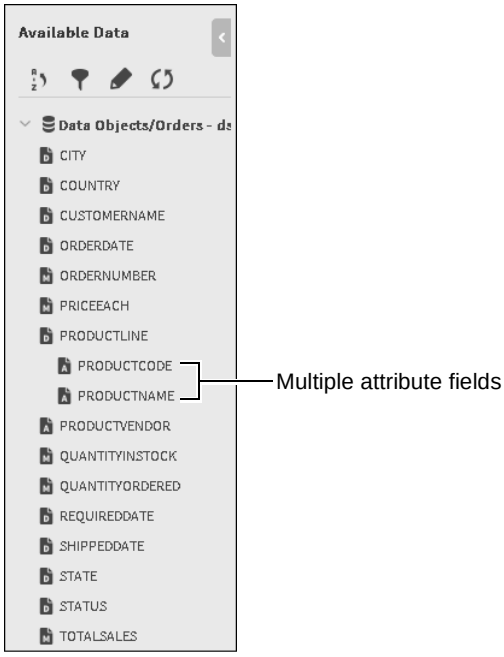


Figure 4-12 Examining a data object containing a dimension with multiple attribute fields

In a summary table, dimension columns can be moved only among other dimension columns. Dimension columns can also contain associated attribute fields. You cannot move a dimension column independently of its associated attribute columns. Dimension columns and associated attribute columns always appear preceding the measure columns in a summary table.

When you delete a dimension column containing associated attributes from a summary table, the attribute fields still remain.

Working with an attribute column

Attributes represent subcategories of a broader category, or dimension. For example, Product Code and Product Name can be attributes of a dimension, Product Line. For an attribute to be useful in a summary table, it must be associated with a dimension field in the data set. Multiple attribute columns associated with a single dimension field are called peer attribute columns. In a summary table that contains one or more dimension columns, and associated attributes, data in the attribute columns cannot be grouped and does not display subtotals.

In a summary table that contains one or more peer attribute columns, and no dimension columns, data in the attribute columns cannot be grouped and does not display subtotals. In a summary table that contains one or more non-peer attribute columns and no dimension columns, data in the outermost attribute column is grouped and displays subtotal aggregate values.

Attribute columns appear following the associated dimension column in a summary table. When you insert an attribute column in a summary table containing the associated dimension column, the attribute appears after the dimension column.

The example in Figure 4-13 shows a dimension column, Country, an associated attribute column, State, and a measure column, Quantity Ordered. There are no grouped columns in the summary tables and Report Studio displays aggregate values for the entire table.

COUNTRY	STATE	SUM (QUANTITYORDERED)
Australia	Victoria	110
USA	CA	162
USA	NV	105
Grand Total		377

Figure 4-13 Dimension, associated attribute, and measure columns

When you insert an attribute column in a summary table that does not contain an associated dimension column, or other attribute columns, the attribute column is inserted to the left in the report table, but cannot be grouped if it is the only attribute column in the summary table. When you insert one or more non-peer attribute columns in a summary table with no dimension columns, you can group data in the outermost attribute column, and subtotal values are displayed for this grouped column.

The example in Figure 4-14 shows two non-peer attribute columns, State and Product Name, and one measure column. Data in the State column is grouped, and aggregate data values are displayed for each group. When you insert an attribute column in a summary table containing a dimension column that is not associated with it or the other attribute columns in the summary table, the new column appears in the position you select, as shown in Figure 4-15.

STATE	PRODUCTNAME	SUM (QUANTITYORDERED)
CA		
	1952 Alpine Renault 1300	162
Sub Total (CA)		162
NV		
	1949 Jaguar XK 120	105
Sub Total (NV)		105
Victoria		
	1956 Porsche 356A Coupe	110
Sub Total (Victoria)		110
Grand Total		377

Figure 4-14 Attribute and measure columns

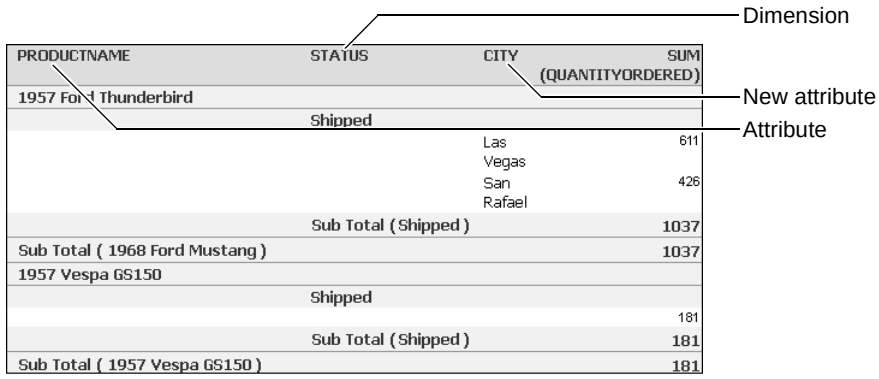


Figure 4-15 Inserting a non-associated attribute field in a summary table

In a summary table containing multiple dimensions and associated attribute fields, you can reorder attribute fields only among peer attribute fields. To move an attribute field, select the column, and choose Reorder Columns from the context menu. When you move a dimension column with its associated attribute columns in a summary table, the columns are placed in their new position as a single unit. You cannot move a dimension column without moving the associated attribute columns.

To delete each attribute column, select each column, and choose Delete.

Working with a measure column

Every summary table must contain at least one measure column to display aggregate data. A measure column is typically inserted to the right of any dimension and attribute columns in a summary table. When you insert a measure column in a summary table, aggregate data is displayed based on the default aggregation function set by the developer at the time of creating the data set. You can modify the aggregate function and add additional aggregation functions using Report Studio.

How to add an aggregate calculation

You can apply multiple aggregate functions to a single measure column in a summary table. To add an aggregate function, complete the following steps:

1. In Available Data, double-click the measure column.

   Select Subtotal Function appears, as shown in Figure 4-16.

2. In Select Subtotal Function, select an aggregate function from the drop-down list.

3. Choose OK. The measure column you selected appears in the BIRT design displaying aggregate values for the new aggregate function you defined.

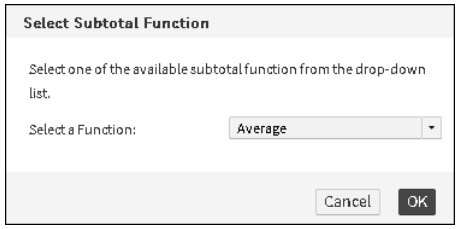


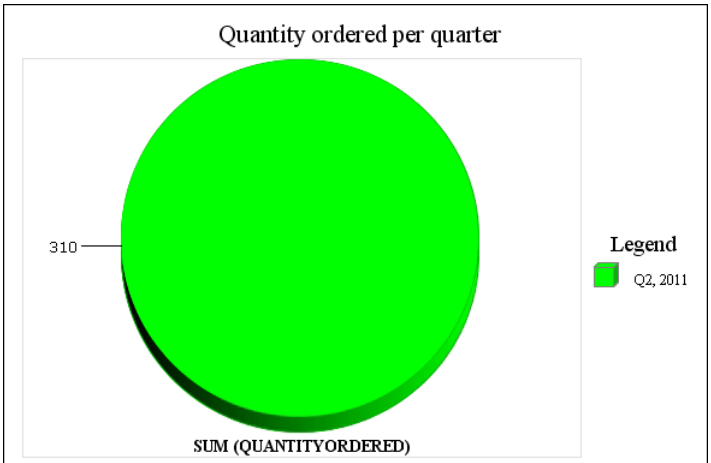
Figure 4-16 Adding an aggregate function

When you move a measure column in a summary table, you can move it among other measure columns.

To delete a measure column, select the column, and choose Delete.

Inserting a chart in a summary table

You can insert a chart at the table level in a summary table. Report Studio assigns the outermost grouped column as the category, or *x*-axis, by default. You can select the value series on the *y*-axis from the available measure columns. Figure 4-17 shows a pie chart displaying the total product quantities ordered each quarter. The outermost grouped column is Order Date, which Report Studio sets as the category axis. You can choose either of the two measure columns as the *y*-axis, or both, to display multiple value series.



ORDERDATE	COUNTRY	STATUS	SUM (QUANTITYORDERED)	SUM (ORDERTOTAL)
Q2, 2011				
	USA			
		Shipped	310	$22,873.22
	Sub Total (USA)		310	$22,873.22
Sub Total (Q2, 2011)			310	$22,873.22
Grand Total			310	$22,873.22

Figure 4-17 A summary table displaying a pie chart

Changing table types

In Report Studio, you can convert a summary table to a detail table, or a detail table to a summary table. When you change table types, the data in the original report table is lost, and must be recreated by reinserting the selected data fields.

How to convert a summary table to a detail table

1 In Report Studio, choose Turn off Auto Summarize.

A message appears and informs you that if you choose to continue, all data in the current table will be lost, as shown in Figure 4-18. Choose OK.

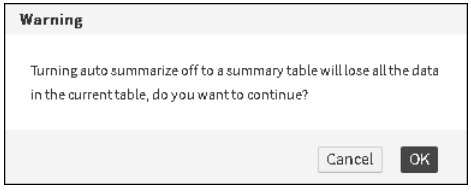


Figure 4-18 The warning message that appears when you choose to convert a summary table to a detail table

2 Choose Insert to reinsert the selected fields to create a new BIRT design. Report Studio displays the chosen data fields in a detail table.

How to convert a detail table to a summary table

1 In Report Studio, choose Turn on Auto Summarize.

A message appears and informs you that if you choose to continue, all data in the current table will be lost, as shown in Figure 4-19. Choose OK.

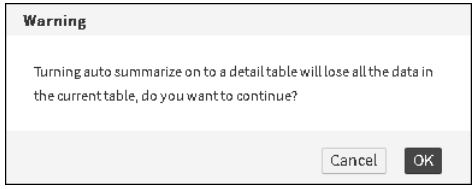


Figure 4-19 The warning message that appears when you choose to convert a detail table to a summary table

2 Choose Insert to reinsert the selected fields to create a new BIRT design. Report Studio displays the chosen data fields in a summary table.

Chapter

5

Presenting data in a cross tab

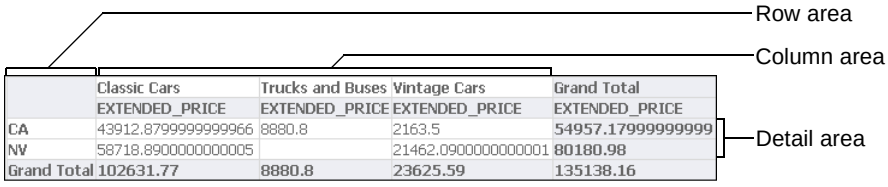
This chapter contains the following topics:

- About cross tabs
- Obtaining data for a cross tab
- Creating a cross tab

About cross tabs

A cross tab displays data in a row-and-column matrix that has a spreadsheet-like appearance. The cross tab is ideal for summarizing data in a compact and concise format, and displays summary, or aggregate, values such as sums, counts, or averages. A cross tab groups these values by one set of data listed down the left of the matrix and another set of data listed across the top of the matrix.

Figure 5-1 shows a cross tab that displays sales totals by state and by product line.



	Classic Cars	Trucks and Buses	Vintage Cars	Grand Total
	EXTENDED_PRICE	EXTENDED_PRICE	EXTENDED_PRICE	EXTENDED_PRICE
CA	43912.8799999999966	8880.8	2163.5	54957.17999999999
NV	58718.8900000000005		21462.0900000000001	80180.98
Grand Total	102631.77	8880.8	23625.59	135138.16

Figure 5-1 Displaying sales by state and product line in a cross tab

The cross tab uses data from the state, product line, and extended price fields. A cross tab typically uses data from at least three fields, as follows:

- One field populates the column headings in the cross tab. There is one column for each unique value in the field. In the example shown in Figure 5-1, four unique values from the Product Line field—Classic Cars, Motorcycles, Trucks and Buses, and Vintage Cars—appear in an area called the column area.
- One field populates the row headings in the cross tab. There is one row for each unique value in the field. In this example, two unique values from the state field, CA and NV, appear in the row area.
- Report Studio aggregates the values in one field and displays these values in the cross tab cells. In this example, each cell displays a revenue total by product line and state. In this example, revenue totals are calculated using the SUM function on the values in the Extended_Price field. Totals appear in the detail area.

You can use Report Studio to insert a cross tab in a BIRT design, select data for the cross tab, and specify the aggregate data to display. You can also define a bookmark for a cross tab, and then create a hyperlink from another report that links to the bookmarked cross tab element.

You can then use Actuate Interactive Crosstabs, which requires a separate license, to edit data in the cross tab, format the data values, and modify cross tab data. You can access Interactive Crosstabs from Report Studio, Interactive Viewer, and Actuate Dashboards.

Obtaining data for a cross tab

In Report Studio, a cross tab derives data from a data object containing at least one cube or data model. Ensure that you select a data object that contains one or more cubes, or data models, to create the cross tab.

Creating a cross tab

In Report Studio, complete the following tasks to create a cross tab:

- Select data for the cross tab.
- Lay out the cross tab.
- Specify display options for the aggregate values.

Sometimes data objects created in BIRT Designer Professional contain links to enable users to drill through the data hierarchy in the data object to view either summary or detail information. For example, consider data organized in years, in a quarter-month-week hierarchy. If the data object contains defined hyperlinks for this hierarchy, choosing a year displays the quarters that make up the year, choosing a quarter displays the months in the quarter, and so on.

Selecting data for a cross tab

When building a cross tab, you group the aggregate data by at least two dimensions. To create the cross tab, one dimension is inserted in the row area, and one dimension (Productline) is inserted in the column area.

Each additional dimension by which you group data appears as a column or row, and provides a more comprehensive and detailed view of the data. If you calculate aggregate data by too many dimensions, the resulting cross tab can display several empty cells, causing a problem known as data sparsity. Additionally, a cross tab that contains more than two or three dimensions in either the row or column area is difficult to read. Avoid these problems by dividing the data into multiple cross tabs, enabling users to understand the data more quickly and easily.

How to select data for a cross tab

1. In Report Studio, choose New. Report Template appears.
2. In Report Template, complete the following steps:
    1. In Category, select Standard from the drop-down list.
    2. In Available Templates, select Crosstab, as shown in Figure 5-2.

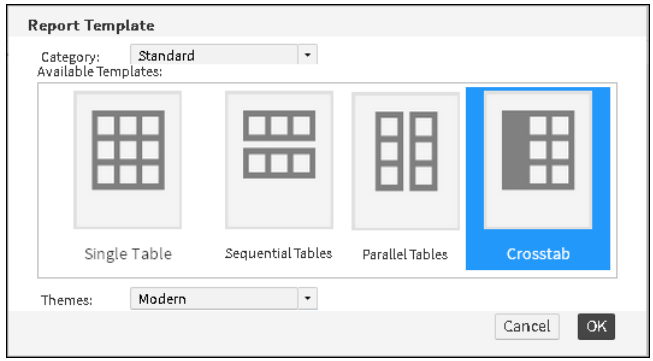


Figure 5-2 Choosing the cross tab template

3 In Themes, select a theme from the drop-down list if your cross tab template contains associated themes.

Choose OK. Crosstab Builder—Data appears.

3 In Use Data From, choose New Data.

Select Data appears as shown in Figure 5-3, displaying the available data objects. If you use customized data objects, ensure that they are placed in the /Resources folder of the BIRT iHub volume.

4 In Available Data, select a data object design or data object store file containing a cube or a data model. Then, choose the right arrow.

The data object appears in Selected Data, as shown in Figure 5-3. Choose OK. To modify your selection, in Selected Data, select the data object and choose the left arrow. Then, repeat step 4.

Crosstab Builder—Data displays the data from the cube or data model.

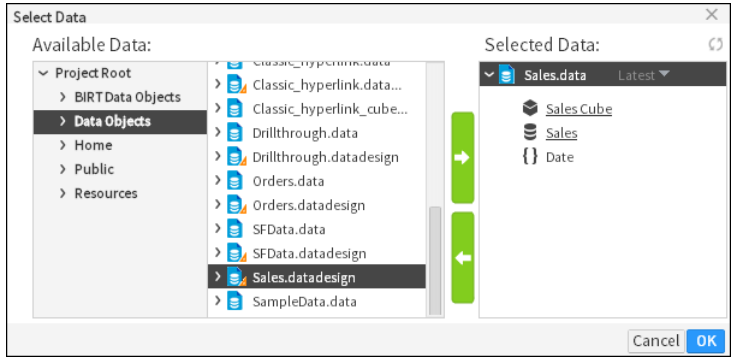


Figure 5-3 Selecting a data object

Laying out data in a cross tab

When you lay out data in a cross tab, provide the following information:

- In Dimensions, specify:
  - The grouped data fields to display as rows
  - The grouped data fields to display as columns
- In Measures, specify the summary fields to display in the cross tab.

How to lay out data in a cross tab

1. In Crosstab Builder—Data, in Dimensions, in Available Data, select a grouped data field. To select multiple data fields, press Ctrl as you select each field.
2. Choose the right arrow next to Row to set the selected field as a row, or choose the right arrow next to Column to set the selected field as a column. The example shown in Figure 5-4 specifies State as a row, and Product Line as a column.

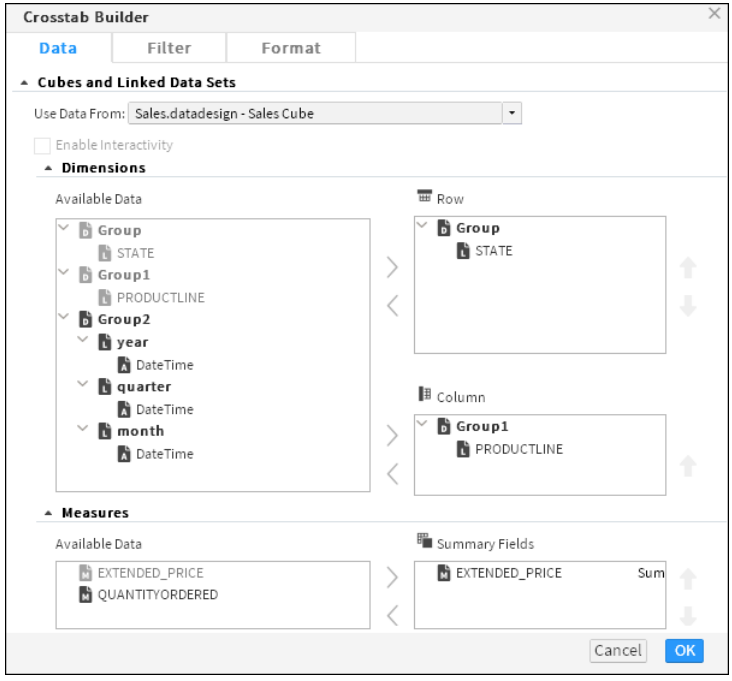


Figure 5-4 Selecting data to display in the cross tab

3. In Measures, in Available Data, select a data field to aggregate, then choose the right arrow to set the selected field as a summary field. The example in Figure 5-4 sets the Extended Price field as the summary field.

Choose OK. If the OK button is not visible in your web browser, select the up arrow in the Dimensions or Measures area until the OK button becomes accessible. The selected fields appear in a cross tab in Report Studio.

Filtering data in a cross tab

To display a subset of the available data in the cross tab, you can specify a filter condition for the cube or data model, as shown in Figure 5-5.

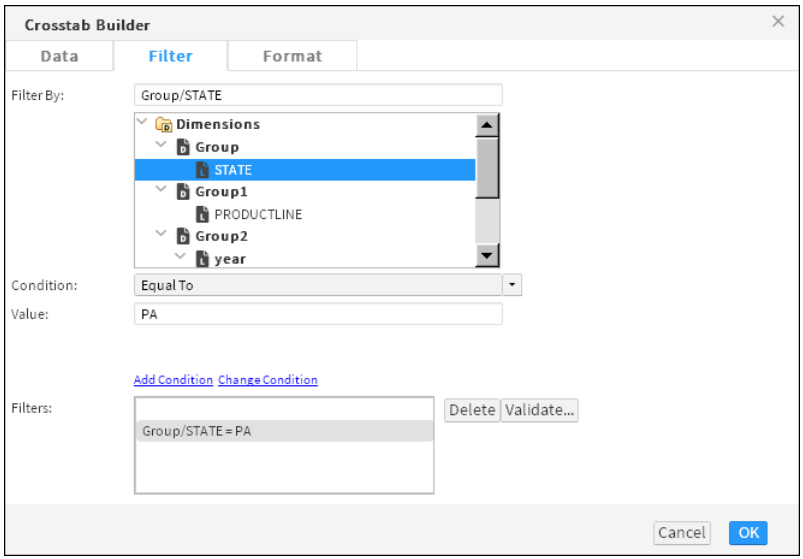


Figure 5-5 Specifying a data object filter

To create a filter at the data object level, choose Filter, and specify one or more filter conditions, as you would do for a BIRT report. For example, to view data only for Pennsylvania (PA), create a filter on the state dimension using the Equal To operator, as shown in Figure 5-5.

The cross tab displays aggregate extended price data by product line, for only the state of Pennsylvania, as shown in Figure 5-6.

	Classic Cars	Trucks and Buses	Vintage Cars	Grand Total
	EXTENDED_PRICE	EXTENDED_PRICE	EXTENDED_PRICE	EXTENDED_PRICE
PA	102856.2400000000026	37483.0900000000002	34925.009999999999	175264.34
Grand Total	102856.24	37483.090000000004	34925.01	175264.34

Figure 5-6 A cross tab displaying filtered data rows

You can also select the In operator in Condition to set a filter condition for more than one value. For example, you can define a filter condition that displays data for Pennsylvania (PA), California (CA), and Massachusetts (MA) in the cross tab.

Displaying aggregate values

The cross tab in Figure 5-6 displays sales data by product line and state.

You can display totals for each dimension that you add to a cross tab and for each level within a multilevel dimension. The rows and columns that display the subtotals and grand totals are highlighted in the cross tab. In the example cross tab you just created, no subtotals appear. Subtotals are displayed when you set a multidimensional data field, as a row or column.

Each number displayed in a cross tab represents an aggregate total. Grand totals display the total sales of all products for each state, the total sales of each product, or the total of all sales across products and states. Subtotals display the sales of each product in each state, and so on. You specify the aggregate totals that appear in a cross tab.

How to display aggregate values in a cross tab

1 To specify display properties for the aggregate values in the cross tab, in Crosstab Builder, choose Crosstab Builder—Format, as shown in Figure 5-7.

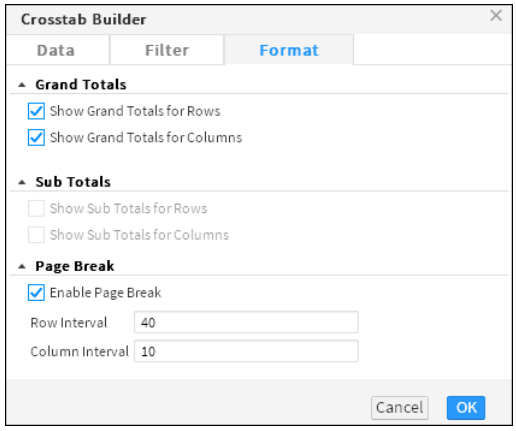


Figure 5-7 Specifying display options for the aggregate values

2 In Grand Totals, do the following:

- Select Show Grand Totals for Rows to display grand totals for each row.
- Select Show Grand Totals for Columns to display grand totals for each column.

3 You can display subtotals for multilevel dimensions used in rows or columns. Because the example in Figure 5-7 does not contain multilevel dimensions, the Sub Totals section is not highlighted. In Sub Totals, if highlighted, do the following:

- Select Show Sub Totals for Rows.
- Select Show Sub Totals for Columns.

4 In Page Break, as shown in Figure 5-7, select Enable Page Break to specify pagination properties for the cross tab, and do the following:

- In Row Interval, type a value, such as 40.
- In Column Interval, type a value, such as 10.

Choose OK. Sample data appears in the cross tab, displaying grand totals for rows and columns, as shown in Figure 5-8.

	Classic Cars	Trucks and Buses	Vintage Cars	Grand Total
	EXTENDED_PRICE	EXTENDED_PRICE	EXTENDED_PRICE	EXTENDED_PRICE
CA	43912.8799999999996	8880.8	2163.5	**54957.17999999999**
NV	58718.8900000000005		21462.0900000000001	**80180.98**
Grand Total	**102631.77**	**8880.8**	**23625.59**	**135138.16**

Figure 5-8 Displaying grand totals for rows and columns in a cross tab

Saving and viewing a cross tab

As with other BIRT design files, Report Studio displays only a preview of the actual data in the cross tab. You save and view a cross tab in the same way that you save and view a BIRT design, as described in earlier sections of this document.

How to save and view a cross tab

1 In Report Studio, choose Save and View.

2 Save BIRT design appears. Specify a file name, and a folder location in which to store the saved file. Choose OK.

The cross tab appears in Actuate Viewer, as shown in Figure 5-9.

	Classic Cars	Trucks and Buses	Vintage Cars	Grand Total
	EXTENDED_PRICE	EXTENDED_PRICE	EXTENDED_PRICE	EXTENDED_PRICE
CA	458563.6399999999962	167896.480000000015	366355.3700000000039	**992815.49**
CT	89671.2799999999975	15671.4899999999997	14101.07	**119443.84**
MA	223366.5899999999998	58487.98	105384.1799999999988	**387238.75**
NH	69150.3500000000002	7922.2899999999995	39376.6500000000002	**116449.29**
NJ			9035.3600000000003	**9035.36**
NV	58718.8900000000005		21462.0900000000001	**80180.98**
NY	260619.729999999996	77996.0000000000003	62342.2800000000003	**400958.01**
PA	102856.2400000000026	37483.0900000000002	34925.009999999999	**175264.34**
Grand Total	**1262946.72**	**365457.33**	**652982.01**	**2281386.06**

Figure 5-9 Viewing the cross tab in Actuate Viewer

Chapter

6

Presenting data in a chart

This chapter contains the following topics:

- Working with charts
- Deleting a chart
- Displaying a chart without table data

Working with charts

A chart is a graphical representation of data. Charts are particularly useful for summarizing numeric data and showing the relationship between sets of values, called series. For example, a chart can show sales by region, average temperatures by month, or the price of a stock over three months.

Because a chart presents a picture, it reveals trends that are not as apparent in a table. Typically, reports display detail data in a table and summary data in a chart, especially if the detail data spans multiple pages. All charts in Report Studio derive data from the report table.

Report Studio supports animated charts based on HTML5 technology. In previous releases, Report Studio supported static charts and Flash charts, but in the current release, Report Studio supports modifying existing static and Flash charts, if you are using reports that contain this content.

When using a chart, you perform the following tasks:

1. Insert a chart at the table or section header level in a BIRT design.
2. Choose a chart type.
3. Specify the data to present in the chart.
4. Format the chart.

The location in which you insert a chart determines what data the chart displays. For example, in a lengthy report, a chart at the table level can display sales and profit totals for the company, while a chart at the sales office section level can display sales and profit totals for each sales office.

How to insert a chart

To insert a chart in the report, complete the following tasks:

- To insert a chart at the table level, select the table, then choose Chart➛Insert Chart.
- To insert a chart at a section level, select the section heading, then choose Chart➛Insert Chart.

When you choose to insert a chart in Report Studio, Chart Builder appears, enabling you to select a chart type, select data for the chart, and format the chart.

Selecting a chart type

Report Studio provides several chart types for use in a BIRT design. After you insert a chart, the first step is to choose the most suitable chart type for the data. The following sections describe the chart types Report Studio supports. Several of the chart types include subtypes.

Working with area charts

An area chart displays data values as a set of points connected by a line, with the area below the line filled. You typically use an area chart to present data that occurs over a continuous period of time. There are three subtypes of area charts: overlay, stacked, and percent stacked.

In an overlay area chart, shown on the left in Figure 6-1, the areas of multiple series overlap. This chart subtype is not suitable for showing multiple series if the data values overlap. For example in a chart displaying sales values for global territories, if the values in one territory, the U.S., are the highest for every quarter, the data for the U.S. obscures the data for Europe and Asia. Use the overlay area chart if you want to show only one series, for example, only sales for Asia.

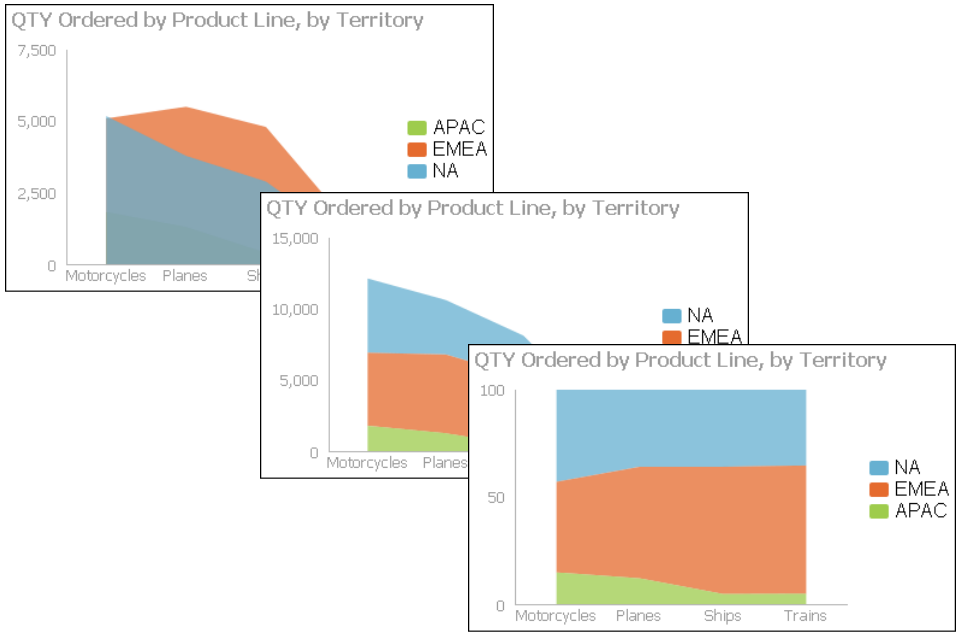


Figure 6-1 Overlay, stacked, and percent stacked area charts

In a stacked area chart, multiple series are stacked vertically, as shown in the chart at the center in Figure 6-1. The example shows that the stacked area chart is suitable for the data because the chart displays totals for all series as well as the proportion that each series contributes to the total. The height of the top line shows the total value for each quarter. Each shaded area represents the sales amount for a specific region.

In a percent stacked area chart shown on the right in Figure 6-1, multiple series are stacked vertically, and the values appear as a percentage of the whole. As the chart in Figure 6-1 shows, the sales values are displayed in percentages instead of

the actual numbers, as shown in the previous area charts. The percent stacked area chart is meaningful only when displaying and comparing multiple series.

Working with bar charts

A bar chart, by default, displays data values as a set of vertical bars, but you can transpose the axes to display horizontal bars. A bar chart is useful for displaying data side by side for easy comparison. There are three subtypes of bar charts: side-by-side, stacked, and percent stacked. The stacked and percent stacked bar charts are functionally similar to the stacked area chart and percent stacked area chart subtypes.

In a side-by-side bar chart, multiple series appear as side-by-side bars, as shown in the chart on the left in Figure 6-2. This bar chart uses the same data as the area charts, shown in the earlier sections.

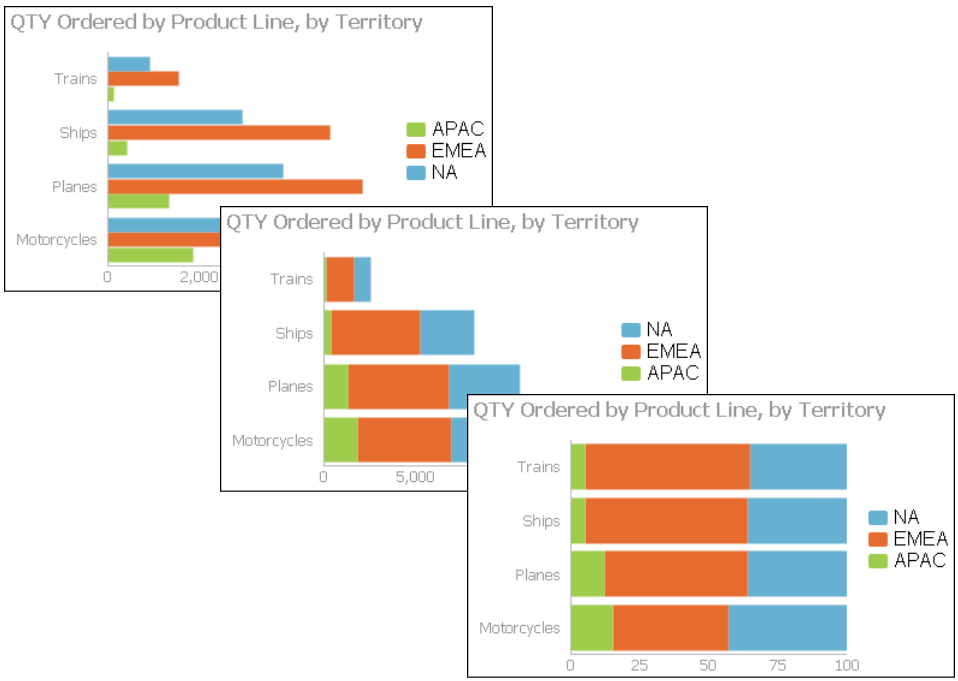


Figure 6-2 Side-by-side, stacked, and percent stacked bar charts

In a stacked bar chart, multiple series are stacked vertically, as shown in the chart in the center in Figure 6-2. The stacked bar chart shows totals for each category, each quarter in this example, as well as the proportion that each series contributes to the total.

In a percent stacked bar chart, multiple series are stacked vertically, and the values are shown as a percentage of the whole. As shown in the chart on the right

in Figure 6-2, the sales values are shown in percentages instead of the actual numbers as shown in the previous bar charts.

Like the percent stacked area chart, the percent stacked bar chart is meaningful only when displaying and comparing multiple series. Do not use this chart subtype if you are displaying only one series, for example, only sales for Asia.

Working with column charts

A column chart displays data values as a set of vertical bars, with categories on the horizontal axis, and values on the vertical axis. This layout is useful for displaying data side by side for easy comparison, as shown in the chart on the left in Figure 6-3.

Figure 6-3 Side-by-side, stacked, and percent stacked column charts

This chart supports a stacked or percent stacked chart subtype that also shows the relationships of values in each category to the whole, as shown in the charts in the center and on the right in Figure 6-3.

Working with line charts

A line chart displays data values as a set of points that are connected by a line. You typically use line charts to present large amounts of data that occur over a continuous period of time. A line chart is the most basic type of chart in finance. The chart on the left in Figure 6-4 shows an example of an overlay line chart.

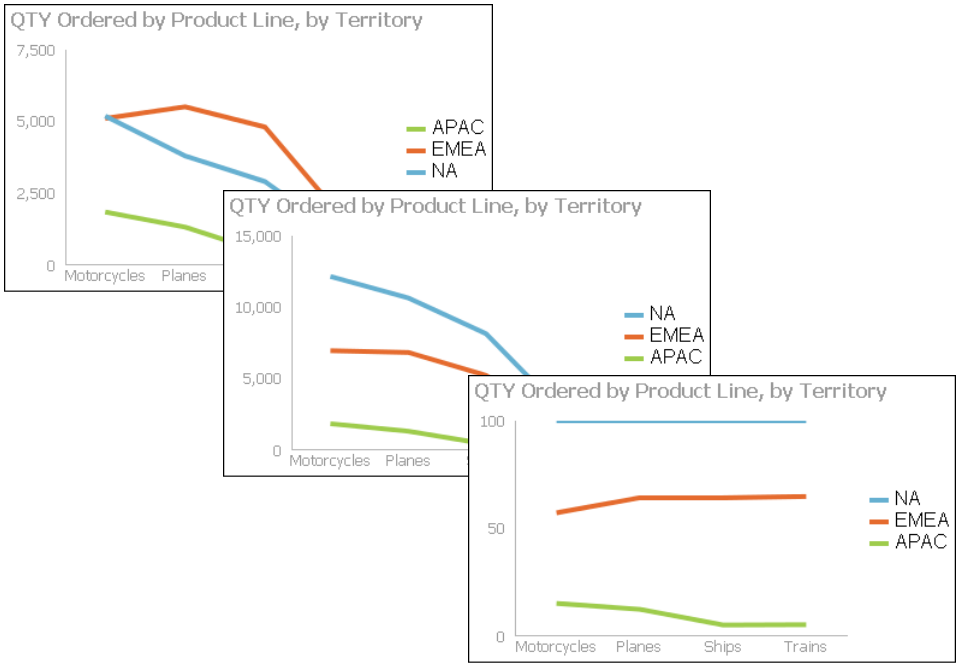


Figure 6-4 Overlay, stacked, and percent stacked line charts

A line chart is similar to an area chart, except that the line chart does not fill in the area below the line. In an overlay line chart, multiple series appear as overlapping lines, as shown in the chart on the left in Figure 6-4. The line chart supports stacked and percent stacked subtypes.

In a stacked line chart, multiple series are stacked vertically, as shown in the chart in the center in Figure 6-4. The stacked line chart shows totals for each series, as well as the proportion that each series contributes to the total. In a stacked area chart, the filled-in areas provide a clear visual cue that each part is compared to the whole.

In a percent stacked line chart, multiple series are stacked vertically and the values are shown as a percentage of the whole. As shown in the chart on the right in Figure 6-4, the sales values appear in percentages instead of numbers. Like the percent stacked area chart, the percent stacked line chart makes sense only when displaying and comparing multiple series. Do not use this chart subtype if you are displaying only one series, for example, only sales for EMEA. Both the stacked line chart and the percent stacked line chart are not as effective as their area chart counterparts.

In addition, as the example shows, a user can easily misinterpret the data in a stacked line chart. There is no obvious indication that the top line shows the total sales amount for each quarter, and the middle line shows the difference in the sales amount between EMEA and APAC.

Working with meter charts

A meter chart displays a value as a needle pointer on a semicircle, called a dial. As Figure 6-5 shows, a meter chart resembles a speedometer, with tick marks and numbers showing a range of values. In this example, the meter chart displays pointers that represent two values: profit and revenue totals for each territory. A meter chart supports standard and superimposed subtypes.

The standard meter chart typically creates a dashboard effect, which is visually compelling. A standard meter chart displays multiple values in multiple dials, where each dial displays a single value, as shown in the chart on the left in Figure 6-5. A superimposed meter chart displays multiple values in a single dial, as shown in the chart on the right in Figure 6-5.

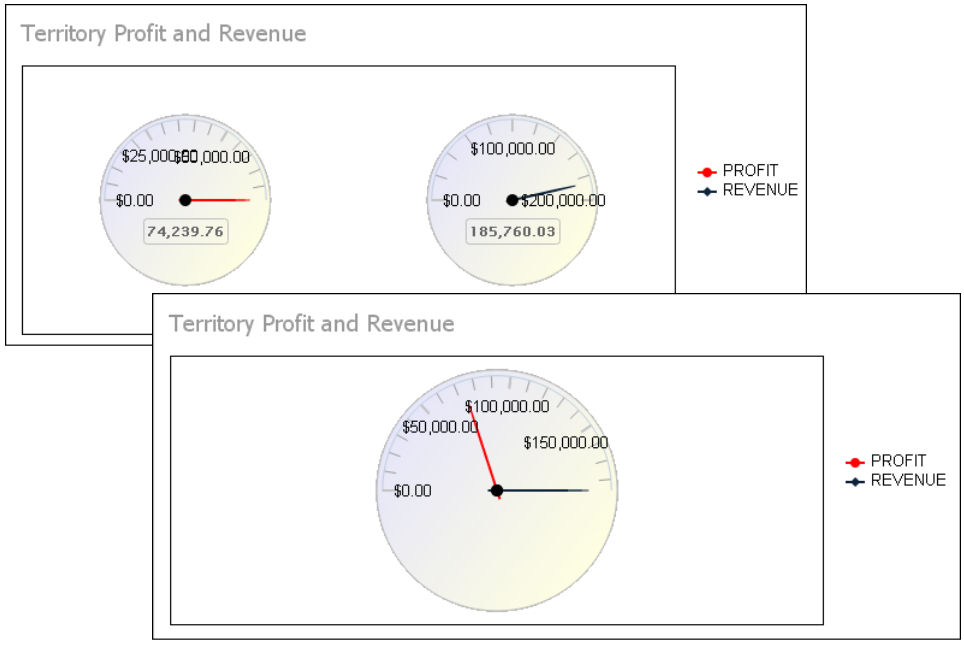


Figure 6-5 A superimposed meter chart showing two values in a single dial

Use the superimposed meter chart type when there are few values to display and when each value is distinct. Duplicate values result in overlapping needles.

Working with pie charts

A pie chart is a circular chart that is divided into sectors or slices. Each sector represents a value that is proportional to the sum of the values. Use a pie chart to show the relationship of parts to the whole, for example, the order quantity each product line contributes to the total, as shown in Figure 6-6.

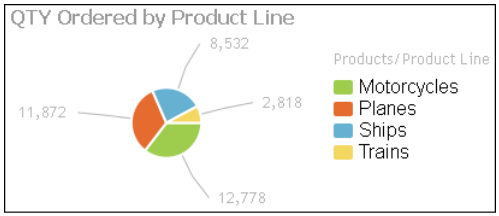


Figure 6-6 A pie chart

Working with doughnut charts

Doughnut charts are similar to pie charts. These are ring charts in the form of segments. Each segment represent a value that is proportional to the total value, as shown in Figure 6-7.

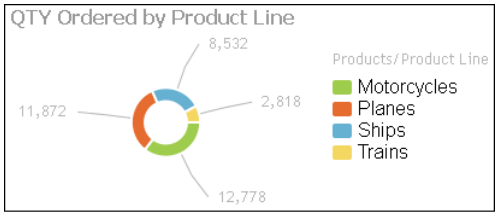


Figure 6-7 A doughnut chart

Working with scatter charts

A scatter chart presents data as *x*-*y* coordinates by displaying two sets of numeric values as single data points. A scatter chart typically is used to display scientific and statistical data because it shows if there is a relationship between two sets of measurements. For example, use a scatter chart to compare salaries and years of experience or weight and body fat. The more data values you include in a scatter chart, the clearer the trends the data reveals.

The scatter chart in Figure 6-8 shows the relationship between quantity ordered and profit over three years. Each pair of values, quantity ordered and profit, is plotted as a single *x*-*y* value.

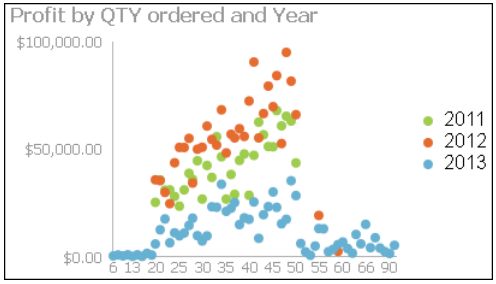


Figure 6-8 A scatter chart

Working with stock charts

A stock chart displays a stock's open, close, high, and low values for a set of trading dates. A stock chart can show the data for one stock or for multiple stocks. Although a stock chart is typically used to display stock data, you can also use it to chart other values such as four daily temperature values for a set of dates: high, low, sunrise, sunset. The stock chart has two subtypes: the candlestick and bar stick stock charts.

A candlestick stock chart consists of a series of boxes with lines extending up and down from the ends, as shown in the chart on the left in Figure 6-9. The top and bottom points of each line indicate the high and low values, respectively. The top and bottom of each box indicate the open and close values. If the close value is higher than the open value, the box is white. If the open value is higher than the close value, the box is shaded. This style enables you to see immediately whether a value posted a gain or a loss for a given day.

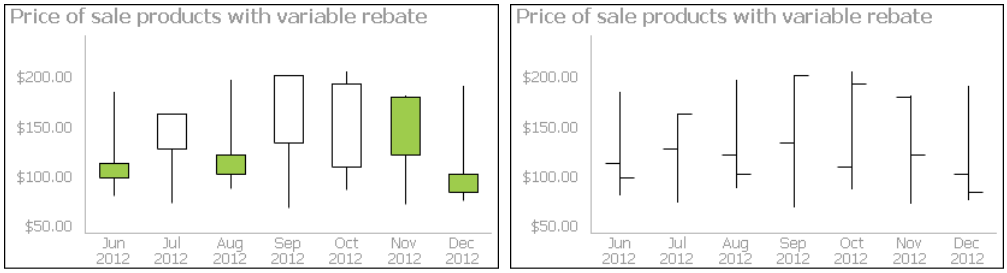


Figure 6-9 Candlestick and bar stick stock charts

A bar stick stock chart consists of a series of vertical bars with horizontal tick marks, as shown in the chart on the right in Figure 6-9. The top and bottom points of each bar indicate the high and low values, respectively. The horizontal tick marks indicate the open and close values. The tick mark on the left of the bar is the open value. The tick mark on the right of the bar is the close value. A bar stick stock chart typically shows the change in price over a period of time. The candlestick stock chart shows the gain or loss pattern more clearly than the bar stick stock chart.

Working with radar charts

Radar charts compare the aggregate values of one or more series of data. A separate spoke from the chart center is shown for each category and each spoke is connected by an arc. A line is drawn connecting the data values for each spoke giving the chart a star-like appearance. Radar charts have two subtypes: standard radar charts and spider radar charts, shown in Figure 6-10.

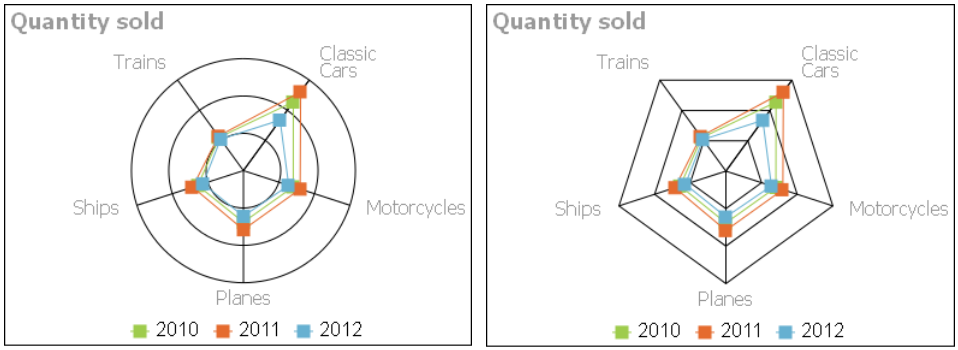


Figure 6-10 Standard and spider radar charts

A spider radar chart connects the outer spokes using lines and a standard radar chart uses arcs, as shown in the chart on the left in Figure 6-10. Radar charts are most effective for small data sets containing only a few hundred data rows. For larger data sets, or those containing a time series, use a line chart.

Working with difference charts

A difference chart shows a variation between two sets of data by shading the area between points of comparison. A difference chart is useful when you want to display the deviation between two sets of data values, as shown in Figure 6-11.

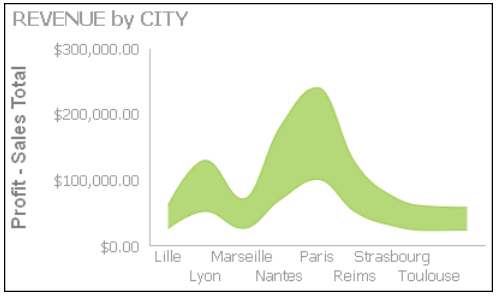


Figure 6-11 A difference chart

Working with Gantt charts

A Gantt chart graphically presents project scheduling information by displaying the duration of tasks. One axis contains the time series, and the other contains tasks. You can use color-coded bars to show the planned duration of the stages to complete the tasks. Bars can use multiple colors to differentiate between stages. Gantt charts use symbols on bars to mark beginning and ending dates. The colors of the bars represent the task status. Optionally, markers designate the start and end dates of tasks. Figure 6-12 shows a Gantt chart.

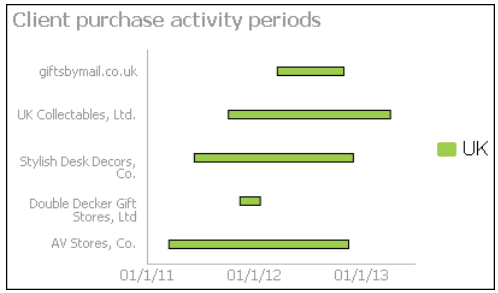


Figure 6-12 A Gantt chart

Working with bubble charts

A bubble chart displays three sets of numeric data values at a time: two values are data points with *x*-*y* coordinates on the axes, and the third value defines the size of the bubble at each point. A typical use of a bubble chart is to present financial data, such as quantity sold, profit margin, and total profit sales of multiple product lines. Figure 6-13 shows a bubble chart.

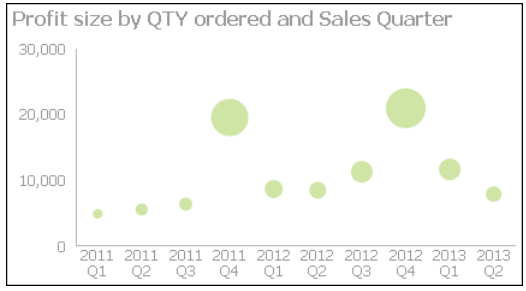


Figure 6-13 A bubble chart

Selecting data for a chart

In Report Studio, because the data for a chart comes from the data in a table, you must create the table before you create a chart. To display only a chart in your report, hide the table after you create the chart.

A chart shows the relationship between sets of values called series. There are two types of series: value and category. A value series contains numeric values, such as prices or sales totals. These values determine, for example, the height of a bar in a bar chart or the size of a sector in a pie chart. For charts that use axes to display data, value series values appear on the *y*-axis. A category series determines how to group the values, for example, by year, by country, or by product line. For charts that use axes, category series values appear on the *x*-axis. For all chart types, you must select one column as the category series and at least

one column as the value series. You can select two columns to display two value series. Each example in the following section shows the following items:

- The type of chart
- The table data on which the chart is based
- The selections in HTML5 Chart—Data

Selecting data for an area, bar, column, or line chart

Area charts, bar charts, column charts, and line charts can often be used interchangeably to display the same types of data. This section shows an example of selecting data for these chart types.

Example

The area, bar, and line charts in Figure 6-1, Figure 6-2, and Figure 6-4 show quantity ordered by product line and territory. Figure 6-14 shows a part of the table data that the charts use. The data in the table is already aggregated. The table shows the total quantity ordered by product line. Each value is plotted in each of the charts.

Territory	APAC	
Product Line		QUANTITYORDERED
Motorcycles		
	Total	1852
Planes		
	Total	1330
Ships		
	Total	428
Trains		
	Total	139
	Total	3749
Territory	EMEA	
Product Line		QUANTITYORDERED
Motorcycles		
	Total	5106
Planes		
	Total	5513
Ships		
	Total	4808
Trains		
	Total	1544
	Total	16971

Figure 6-14 The table data used by the area, bar, line, and column charts

Figure 6-15 shows the data selected in HTML5 Chart—Data for the overlay area, overlay line, side-by-side bar, and side-by-side column charts in the earlier examples. The Product Line column is the category axis and the Quantity Ordered column is the value axis. The category values are grouped by product line, and the legend values are grouped by territory.

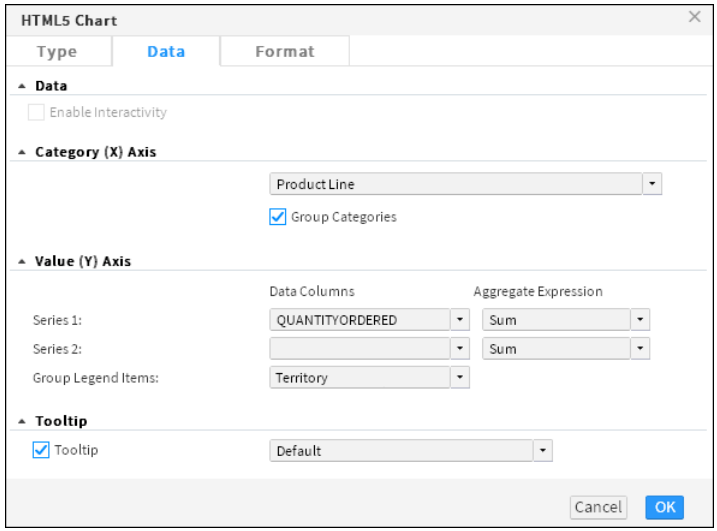


Figure 6-15 The data selected for the area, bar, column, and line charts

Selecting data for a pie or doughnut chart

Unlike other chart types, a pie chart can display only one value series. For example, a pie chart can show sales totals by product line, but it cannot show sales totals and profit totals by product line. This section discusses an example of selecting and organizing data for a pie or doughnut chart.

Example

The pie and doughnut charts in Figure 6-6 and Figure 6-7 show quantities ordered by product line. Figure 6-16 shows the table data that both charts use.

Product Line		QUANTITYORDERED
Motorcycles		
	Total	12778
Planes		
	Total	11872
Ships		
	Total	8532
Trains		
	Total	2818
	Total	36000

Figure 6-16 The table data used by the pie and doughnut charts

Figure 6-17 shows how the data is selected for the charts. The Product Line column is the category series, and the Quantity Ordered column is the value series. In addition, the data is grouped by product line, and the SUM function calculates the total quantity ordered for each product line.

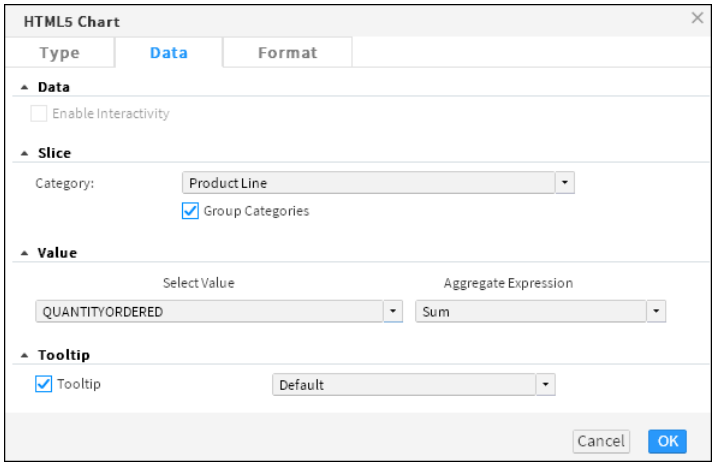


Figure 6-17 The data selected for the pie and doughnut charts

Selecting data for a meter chart

Unlike most chart types, a meter chart does not display data on a *y*- or *x*-axis. Instead, a meter chart displays each data value as a needle on a dial. A meter chart is used to emphasize a small number of values. This section shows an example of selecting and organizing data for meter charts.

Example: Using a meter chart

The superimposed meter chart in Figure 6-5 shows two values, profit and revenue. Figure 6-18 also shows the table data that the chart uses. The meter chart displays the aggregate values in the Profit and Revenue columns of the table.

Territory	EMEA	
	PROFIT	REVENUE
	$1,804,005.15	$4,520,712.28

Figure 6-18 The table used by the meter chart

Figure 6-19 shows how the data is selected for the chart. A category series is typically not essential to a meter chart, but is required in this chart, which displays profit and revenue for each territory, so the Territory column is selected. The aggregate data in the Profit column and the Revenue column are the value series.

Selecting data for a scatter or bubble chart

A scatter chart displays data as *x*-*y* coordinates. It combines each pair of numeric values into single data points. This section shows examples of selecting and organizing data for a scatter chart and a bubble chart.

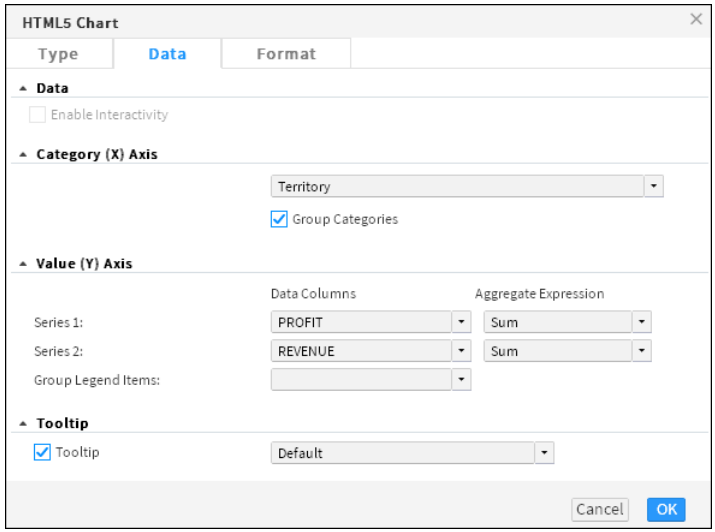


Figure 6-19 The data selected for the meter charts

Example 1: Using a scatter chart

The scatter chart in Figure 6-8 shows the relationship between profit and quantity ordered. Figure 6-20 shows the table data that the scatter chart uses. The chart uses data from the Quantity Ordered and Profit columns.

ORDERDATE		QUANTITYORDERED		PROFIT
Q1, 2011	Total	4561	Total	$163,904.29
Q2, 2011	Total	5695	Total	$203,663.37
Q3, 2011	Total	6629	Total	$246,125.00
Q4, 2011	Total	19554	Total	$706,930.28
Q1, 2012	Total	8694	Total	$319,596.74
Q2, 2012	Total	8513	Total	$318,075.96
Q3, 2012	Total	11311	Total	$409,638.02
Q4, 2012	Total	20969	Total	$762,070.42
Q1, 2013	Total	10995	Total	$388,032.15
Q2, 2013	Total	8595	Total	$307,844.02
	Total	105516	Total	$3,825,880.25

Figure 6-20 The table data used by the scatter and bubble charts

Figure 6-21 shows how the data is selected for the chart.

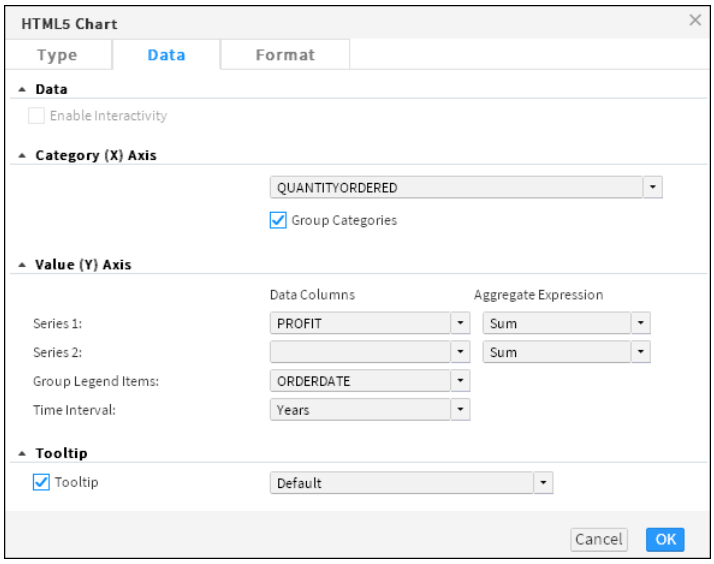


Figure 6-21 The data selected for the scatter chart

The Quantity Ordered column is the category series, and the Profit column is the value series. The data is grouped by the category axis values, and aggregated using the SUM function for the Profit column, to display total profit. The legend is grouped by order date using the year interval.

Example 2: Using a bubble chart

A bubble chart resembles a scatter chart, but shows data as bubbles instead of as points. The bubble chart shown in Figure 6-13 uses data from the table shown in Figure 6-20, but displays three numeric values per data point. Two numeric values, sales quarter and quantity ordered, define the position of the bubble, and a third numeric value, profit, defines the size of the bubble.

As shown in Figure 6-22, the Order Date column, grouped by the quarter interval, is the category series and the Quantity Ordered and Profit columns are the value series. The SUM aggregate function calculates the total quantity ordered and profit values for each quarter.

Selecting data for a stock chart

A stock chart requires the following data:

- Date values as the category series
- High values, low values, open values, and close values as the value series

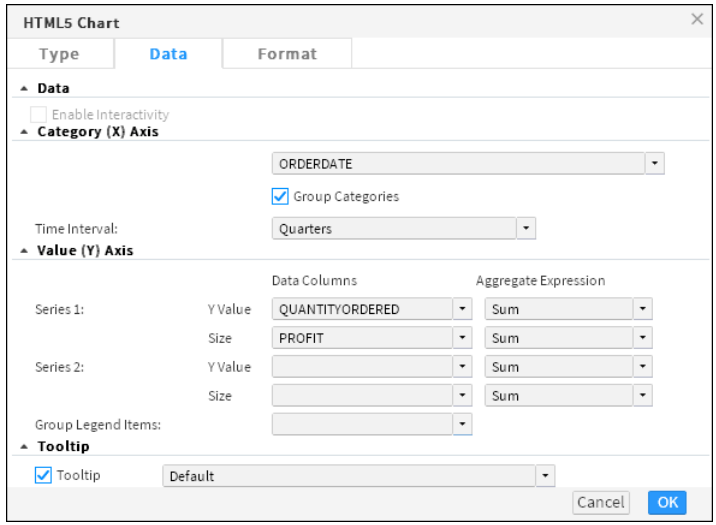


Figure 6-22 The data selected for the bubble chart

Example: Using a stock chart

The stock chart in Figure 6-9 shows a product's high, low, open, and close price for seven months. Figure 6-23 shows the table data and Figure 6-24 shows how data is selected for the chart. The Date column is the category series. Aggregated values in the Price Each column are the value series.

ORDERDATE	PRODUCTCODE	PRICEEACH
June, 2012		
	S10_1678	
		89
	S10_1949	
		177.87
	S10_2016	
		107.05
	S10_4698	
		193.66
	S10_4757	
		116.96
July, 2012		
	S10_1678	
		81.35
	S10_1949	
		171.44
	S10_2016	
		115.37
	S10_4698	
		154.93
	S10_4757	
		136

Figure 6-23 The table data used by the stock charts

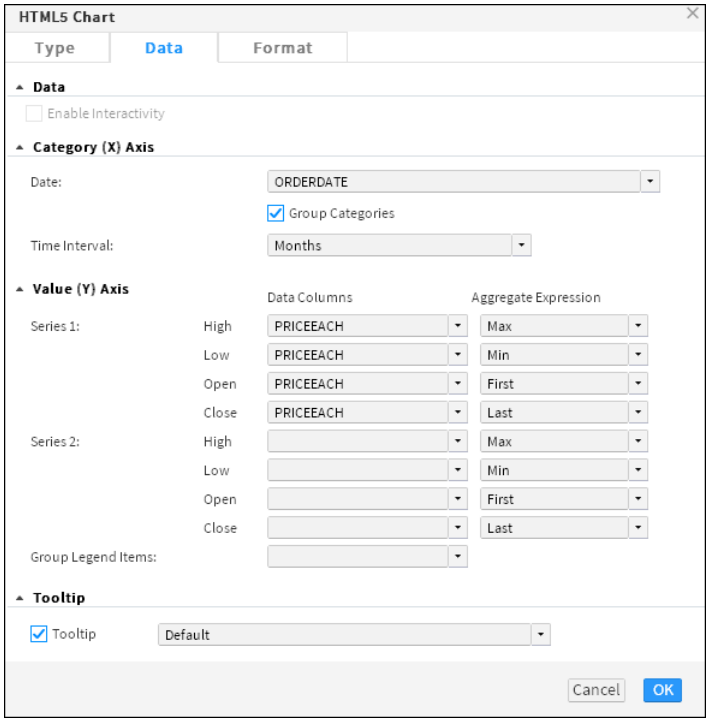


Figure 6-24 The data selected for the stock chart

Selecting data for a Gantt chart

A Gantt chart typically requires the following data:

- Tasks as the category series
- A date or time as the value series, showing the task beginning and end information

Example: Using a Gantt chart

Gantt charts display schedules that use bars to show beginning and ending dates for multiple tasks. In the example shown in Figure 6-12, one axis contains the time series, and the other contains the task being measured. The Gantt chart measures the ordering activity period for each customer. Figure 6-25 shows the table that supplies data for the Gantt chart shown in Figure 6-12.

CUSTOMERNAME	COUNTRY	ORDERDATE
AV Stores, Co.		
	UK	
		10/14/12
		11/17/12
		10/14/12
		11/17/12
		11/17/12

Figure 6-25 The table used for the Gantt chart

Figure 6-26 shows the data used for the chart.

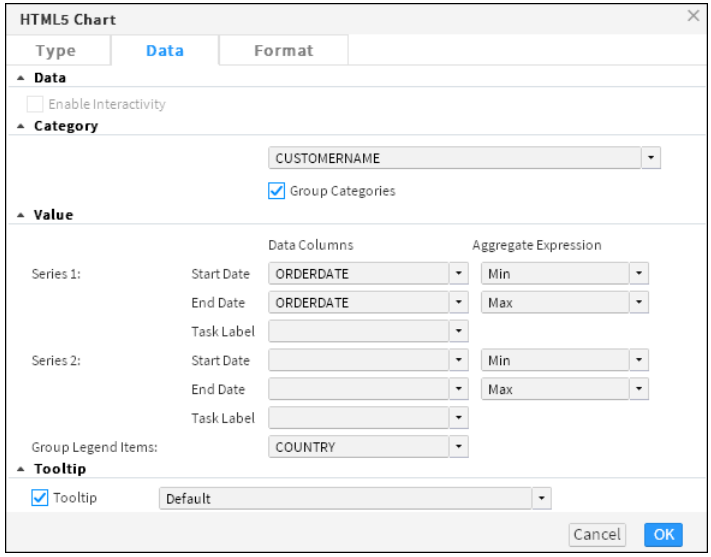


Figure 6-26 Data selection for the Gantt chart

The Customer name field is the category axis, the start and end times use the Order date field set as the value axis. The start and end dates are determined using the aggregate functions MIN and MAX. The legend is grouped by country.

Selecting data for a radar chart

A radar chart displays aggregate values for multiple series of data. This section shows an example of selecting and organizing data for a radar chart.

Example: Using a radar chart

The example in Figure 6-10 shows a standard and spider radar chart displaying quantity sold for each product line by year. Figure 6-27 shows the table that provides data for the radar charts in Figure 6-10.

ORDERDATE	Product Line		QUANTITYORDERED
2011			
	Classic Cars		
		Total	12762
	Motorcycles		
		Total	4031
	Planes		
		Total	3833
	Ships		
		Total	2844
	Trains		
		Total	1000
	Trucks and Buses		
		Total	4056
	Vintage Cars		
		Total	7913
		Total	36439

Figure 6-27 The table providing data for the radar chart

Figure 6-28 shows the data selection for the radar chart shown in Figure 6-10.

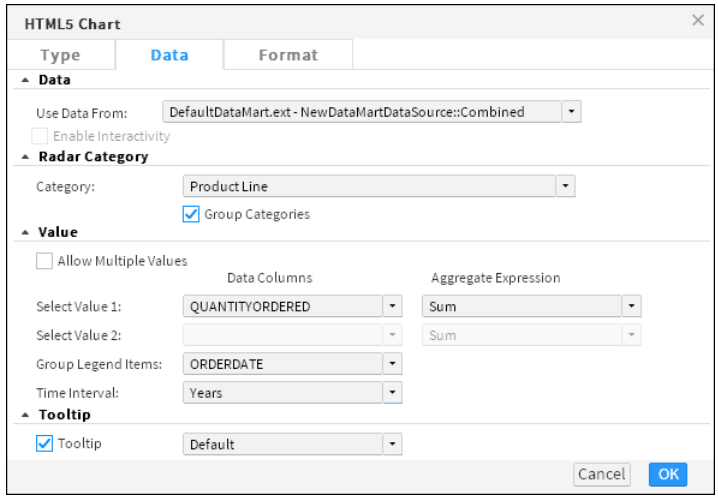


Figure 6-28 Data selection for the radar chart

The Product line field is the category axis, and the Quantity ordered field is the value series. The legend displays values from the Order date field, grouped in yearly intervals. The Quantity ordered field uses the SUM aggregate function, to show the total quantity ordered by product line and year.

Selecting data for a difference chart

A difference chart typically requires the following information:

- A non-numeric data field for the category series
- Two sets of data values, for which deviation is measured, as the value series

Example: Using a difference chart

The difference chart shown in Figure 6-11 calculates the deviation in revenue values by city. Figure 6-29 shows part of the table providing the data for the chart shown in Figure 6-11. Figure 6-30 shows the data selected for the difference chart. The City field is set as the category axis, and the Revenue and Profit field are set as the value axis fields. The value axis fields can include multiple series. Both value axis fields use the SUM aggregate function to display total revenue and total profit values.

COUNTRY	CITY	REVENUE		PROFIT	
France					
	Lille	Total	$61,781.70	Total	$27,143.39
	Lyon	Total	$130,305.35	Total	$53,211.19
	Reims	Total	$126,983.19	Total	$52,698.66
	Strasbourg	Total	$75,859.32	Total	$31,526.60
	Toulouse	Total	$60,483.36	Total	$23,905.16
	Versailles	Total	$58,876.41	Total	$24,610.80
		Total	$1,007,374.02	Total	$413,016.12
		Total	$1,007,374.02	Total	$413,016.12

Figure 6-29 A table providing the data for the difference chart

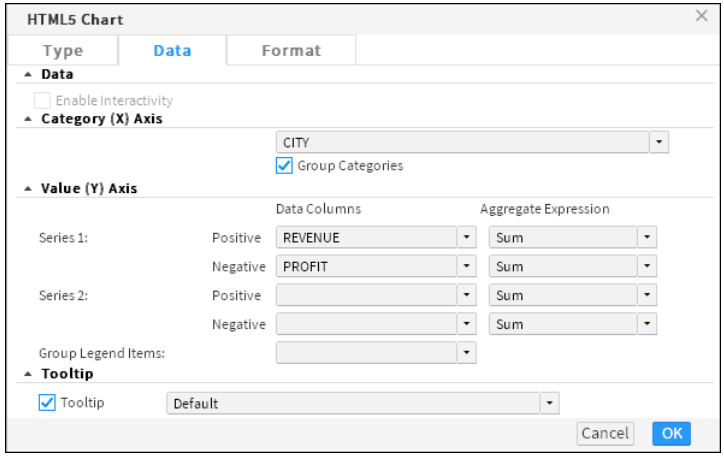


Figure 6-30 Data selection for the difference chart

Displaying hyperlinks in a chart

Sometimes data fields in data objects contain hyperlinks. Hyperlinks enable users to open a URI or drill through to another BIRT document file when choosing a value such as a customer name in a table.

If hyperlinks exist, users can choose whether to display them in the chart or report table. To display existing hyperlinks in a chart, in HTML5 Chart—Data, select Enable Interactivity. To disable existing hyperlinks in a chart, in HTML5 Chart—Data, deselect Enable Interactivity.

Grouping category axis values

When the category axis contains too many values for which to display data individually, you group the values on the category axis. When you group the category axis value, the value series data is aggregated.

Displaying additional series information

In the Chart—Data the Tooltip option appears selected by default, as shown in Figure 6-24. A tooltip displays the value series value when a user hovers the mouse pointer over a bar in a bar chart, a sector in a pie chart, or a data-point marker in a line chart. Figure 6-31 shows a tooltip displaying the open, close, high, and low values for a month when the user hovers the mouse pointer over a candlestick in a candlestick stock chart.

You can disable the tooltip by deselecting the Tooltip option. You can also display a different tooltip value. To display a different tooltip value, select a different column from the drop-down list.

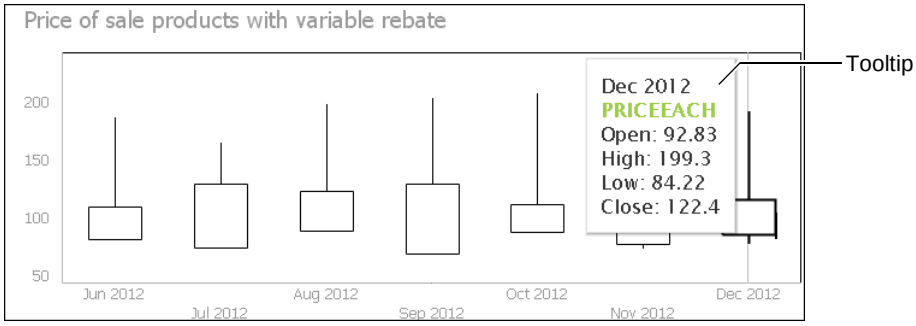


Figure 6-31 A tooltip displaying a value series value

Formatting a chart

When you create a chart and use the default formatting options, the chart type and the data you select determines the basic look of the chart. The template or the software determines styles, such as fonts and colors. You can often improve the appearance of a chart by editing the placeholder text for the chart title, *y*-axis title, or *x*-axis title, and by changing the size or position of the *x*-axis labels.

Selecting a theme

Chart themes customize the appearance of a chart and can change colors, fonts, and display properties for charts. Report Studio provides several predefined themes but custom themes can also be created using BIRT Designer Professional.

The following section shows examples of the available themes used in area charts in Report Studio:

- The chart in Figure 6-32 displays the modern theme.

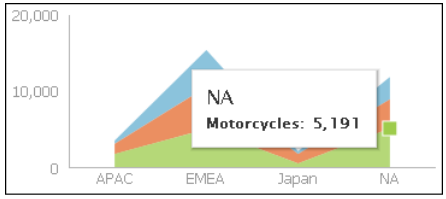


Figure 6-32 An area chart using the modern theme

- The example in Figure 6-33 shows area charts using the clean blue, warm red, and grayscale themes.

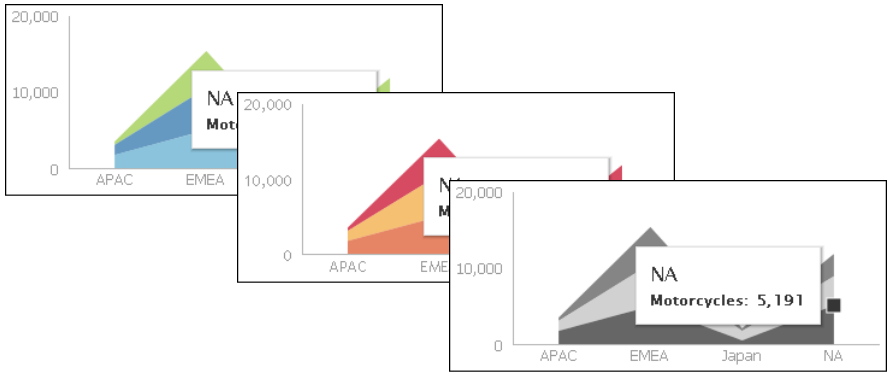


Figure 6-33 Area charts using the clean blue, warm red, and grayscale themes

Using the timeline options

Timeline charts, such as stock charts, can be enhanced to provide zooming options such as the time range selector, scrollbar, and a timeline slider. Using these options is specifically useful when navigating data in a lengthy report that includes a time dimension showing data for hourly or daily stock value over the period of several years.

In Report Studio, you can select a time range selector and a timeline slider bar for users to set time intervals in area, bar, column, difference, line, scatter, and stock charts. Figure 6-34 shows a chart displaying the time range selector and timeline slider.

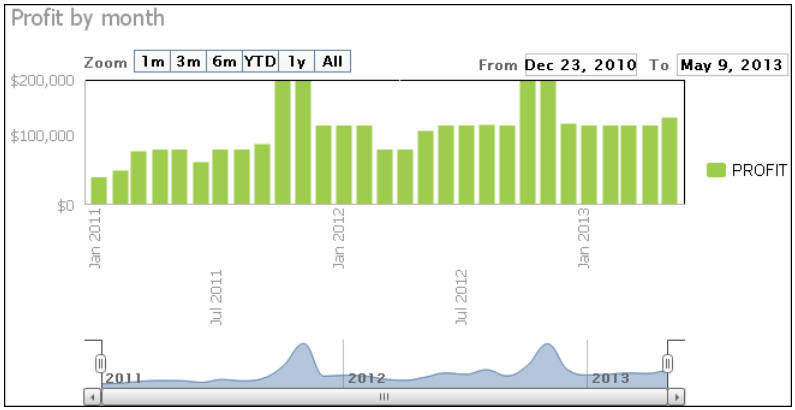


Figure 6-34 Enabling the timeline option in a column chart

The time range selector appears below the chart title and enables a user to view details in small time intervals, year to date, one year, in addition to all the values displayed in the chart. The timeline slider appears at the bottom of the chart and enables users to select a time period by sliding a bar to the beginning or end of the time period. When the category is a time field, you can select the time range selector and timeline slider.

Selecting other formatting options

The following table describes the formatting options available in Report Studio, and the purpose of each option.

Table 6-1 Formatting options and their usage

Formatting option	Usage
Title	Add a title for the chart. This step is more essential if you plan to display the chart and hide the table.
Theme	Optionally select a predefined theme to change the appearance of the chart.
Chart size	Specify a width and height for the chart.
Subtype	Select a subtype from the available options based on the data you want to present in the chart.
Use Glass Style	Select this option to show smooth, rounded edges for bars or columns in a chart.
Allow zoom into	Select this option to enable users to closely analyze details for a specific area on the axis.
Auto scroll bar	Select to enable users to scroll vertically or horizontally, for charts that are too wide.

Table 6-1 Formatting options and their usage

Formatting option	Usage
Legend Title	You can specify whether to display a legend title and select its position.
X-axis title	Provide a title that appears below the *x*-axis.
Y-axis title	Provide a title that appears to the left of the *y*-axis.
Axis label properties	■ Interval: This value on the *x*-axis is set to 1 by default, which means every value appears. To display alternate values, set Interval to 2. ■ Angle: This option places the labels at the specified number of degrees to the axis. ■ Stagger: This option places the labels in a zigzag arrangement.
Step	Type a number that represents the increment between each value. For the *y*-axis, you can specify a minimum and maximum interval: ■ Minimum: Type a number that represents the lowest value to display on the *y*-axis. This number appears at the bottom of the *y*-axis. ■ Maximum: Type a number that represents the highest value to display on the *y*-axis. This number appears at the top of the *y*-axis.

The available formatting options differ based on the chart type you use.

Deleting a chart

To delete a chart from a BIRT design, select and right-click the chart at the report table or section level. Choose Delete. The report element no longer appears in the BIRT design.

Displaying a chart without table data

A BIRT design that contains a lot of information in a series of tables with charts can often be more effective if it displays only the charts. To display only a chart, right-click anywhere in the table, and choose Hide Table. Choose Show All to re-display the table data.

Part Four

Enhancing BIRT application components

Chapter

7

Editing and formatting report content

This chapter contains the following topics:

- Editing and formatting options
- Changing font properties and alignment
- Working with standard formats
- Working with custom formats
- Working with predefined data formats
- Formatting data based on conditions
- Managing columns
- Merging data into a single column
- Adding a new column header row

Editing and formatting options

A typical template contains some editable report elements and some non-editable elements. Examples of editable elements include report titles or tables in which you insert data. Examples of non-editable elements include standard copyright or confidentiality statements. You can only format elements that the template sets as editable.

This chapter describes the editing and formatting tasks you can perform using the default installation of Report Studio. Some editing or formatting functionality might not be available to you if your system administrator configured Report Studio to omit that functionality.

How to select an element for formatting

To format an element, first select and right-click the element. Then, choose the formatting action. You cannot select a single row of data in a table, nor can you select a single data value, unless the value is an aggregate calculation or a column header. To highlight a particular row or value, use conditional formatting.

Changing font properties and alignment

You can change the font properties of editable labels, column headers, and data in a column to specify the font type, size and color, and the background color. You can also make the text bold, italic, or underlined. Additionally, you can change the alignment of text in a label or a column.

When you change the font properties or text alignment for a label or a column of data, the changes you make override the formats in the template or theme. To revert an element to its default font formats, select the element, choose Font, and set the properties to Auto.

How to change font properties

1. Select the label, column header, or column. A box appears around the selected element.

2. Choose Font. Font, as shown in Figure 7-1, displays the current font property values. A value of Auto means the property uses a default value, which is specified by a theme, the template, or the software.
3. Use the drop-down lists to specify the font, size, and size unit for the selected element.

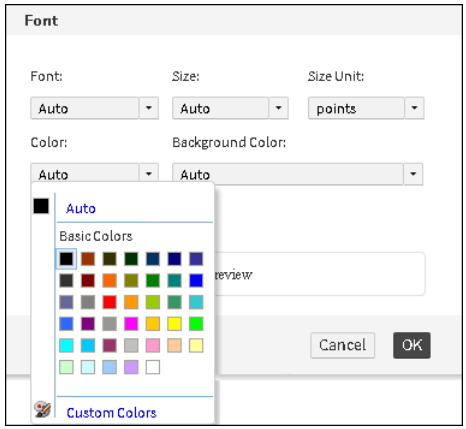


Figure 7-1 Setting font properties

4 In Color, and Background Color, do one of the following, as shown in Figure 7-2:

- Select a color in Basic Colors.

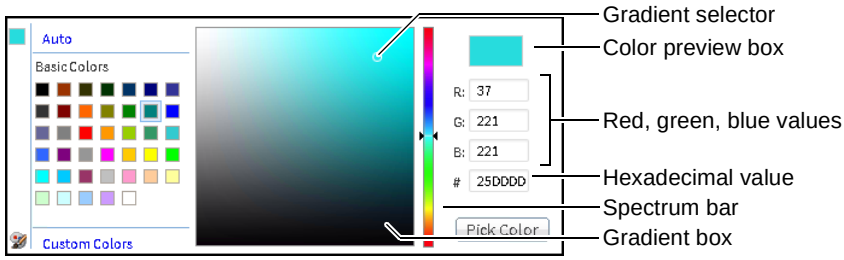


Figure 7-2 Specifying a custom color using the color picker

- Select Custom Colors, and use the spectrum bar to specify a color group. Then, select a shade in the gradient square, and choose Pick Color, as shown in Figure 7-2. The selected options appear in the Preview field.

  The RGB value of the selected color appears in Color. Choose OK.

How to change the alignment of text

You can change text alignment in editable labels, column headers, and columns. Select and right-click the element, then choose an alignment option.

Working with standard formats

The appearance of data in a column depends on the following factors:

- How the data is stored

- The locale to which the system is set
- The format, if any, set by the template or theme

Report Studio provides common formats that control the appearance of data in a column. The formatting options available depend on the type of data in a column. Common types of data include numeric data, string data, and date-and-time data. The following section describes how to work with standard, custom, and predefined data formats in a BIRT design.

Once you apply a number, date-and-time, or string format to a column of data, you can restore the original format that the data source specifies. To do so, select the column, choose Format Data, and select Unformatted.

Applying a standard number format

Report Studio provides common formats you can use to change how numbers appear. You can, for example, display numbers with or without decimal values, in scientific notation, as a percentage, or with a currency symbol.

Even when a column displays numbers, the data in the column can be of string type. Postal codes, for example, are frequently stored as string data. Numeric formats do not apply to numbers of string type. When you select a column for formatting, the title of the formatting dialog box tells you what type of data the column contains. The available formatting options in the menu are standard formats.

How to apply a number format

1. Select the column containing numeric data.
2. Choose Format Data.
3. On Number Column Format, select a format from the drop-down list, as shown in Figure 7-3. You can select a standard format or define a custom format.

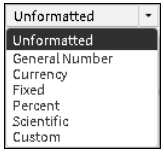


Figure 7-3 Formats for numeric data

Table 7-1 describes the standard number formats that Report Studio supports. The examples in the table reflect the English (United States) locale. If you work in a different locale, the data is formatted differently. For example, a number that appears as 1352.45 in the English (United States) locale appears as 1352,45 in the French (France) locale. When you select a standard number format, you can set additional formatting options, such as the number of decimal places, the inclusion of a thousands separator, a currency symbol, and so on.

Table 7-1 Standard number formats

Format	Example of data display
General Number	6066.45 or 6066.5 or 6067, depending on the original value. This format displays up to two decimal places. Whole numbers and numbers with one or two decimal places appear in their original format.
Currency	$6,067.45 or ¥6067 or 6067€, depending on the symbol, symbol position, decimal place, and thousands separator values you set.
Fixed	6067 or 6067.5 or 6,067.45, depending on the decimal place and thousands separator values you set.
Percent	45% or 45.8% or %45, depending on the symbol position and decimal place values that you set. This format multiplies the original value by 100 and adds the percent (%) symbol.
Scientific	2E04 or 2.67E04, depending on the decimal place value you set. The number after the E represents the exponent of 10. For example, 2.67E04 means 2.67 multiplied by 10 raised to the fourth power.

Applying a standard date-and-time format

Report Studio provides common formats you can use to change how dates and times appear. You can, for example, display dates as January 19, 2008 11:00:00 AM PST or Jan 19, 2008 or 1/19/08.

How to apply a date-and-time format

1 Select a column that contains date-and-time data.

2 Choose Format Data.

3 In Date Time Column Format, in Format Date Time as, select a format. You can select a standard format or define a custom format.

The available formats depend on the locale in which you are working. Figure 7-4 shows the sample formats that appear in the English (United States) locale.

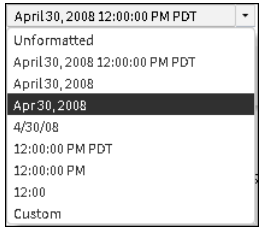


Figure 7-4 Date-and-time formats displayed in English (United States) locale

Applying a standard string format

A column that displays string data displays the data as it is stored in the data source. You can format string data to modify text that contains inconsistent capitalization or to include characters, such as a space or a punctuation mark, at a specific place in the string. For example, you can display telephone numbers in one of the following formats:

```
(415) 555-2121
415.555.2121
415-555-2121
```

How to apply a string format

1. Select a column that contains string data.
2. Choose Format Data.
3. In String Column Format, in Format String as, select a format. You can select a standard format or define a custom format. Standard and custom formats are described in the following sections.

Table 7-2 describes the string formats you can choose and provides examples of how the formatted data appears.

Table 7-2 Standard string formats

Format	Description
Lowercase	The string displays in all lowercase, for example: `john smith`
Uppercase	The string displays in all uppercase, for example: `JOHN SMITH`

Working with custom formats

Report Studio also enables you to specify a custom format for numeric, date-and-time and string data, in cases when the available standard formats do not meet your requirements. To apply a custom format to data, you specify a format pattern.

Applying a custom number format

You can define a custom number format using special symbols to construct a format pattern. A format pattern shows places held by the currency symbol and the thousands and decimal separators. The thousands separator and the decimal separator are locale-dependent. In the English (United States) locale, for example, a comma separates thousands places, and a period separates decimal places. In

most European locales, a space separates thousands places, and a comma separates decimal places. Table 7-3 lists example results of custom number format patterns.

Table 7-3 Results of custom number formats

Format pattern	Data in original format	Result of formatting
0000.00	12.5 124.5 1240.553	0012.50 0124.50 1240.55
#.000	100 100.25 100.2567	100.000 100.250 100.257
$#,###	2000.00 20000.00	$2,000 $20,000
ID #	15	ID 15

Applying a custom date-and-time format

You can define a custom date-and-time format using special symbols to construct a format pattern. Use custom date formatting only for reports that are viewed in a single locale. Custom formats always display dates in the format you set. This format can be inappropriate for other locales. For example, if you use the format MM-dd-yy, the date January 10, 2006, always appears as 01-10-06, regardless of the locale in which the report is viewed. For locales in which dates customarily appear in day-month-year format, the date 01-10-06 is interpreted as October 1, 2006.

Table 7-4 lists the specials symbols used to define custom date-and-time formats.

Table 7-4 Symbols for defining custom date-and-time formats

Symbol	Description	Example
yy	Short year	08
yyyy	Long year	2008
MM	Month as a number	07
MMM	Short month name	Jul
MMMM	Full month name	July
d	Day in month	10
W	Week in month	2

(continues)

Table 7-4 Symbols for defining custom date-and-time formats (continued)

Symbol	Description	Example
w	Week in year	28
DD	Day in year	192
E	Short day of week	Thu
EEEE	Long day of week	Thursday
H	Hour in day (0 - 23)	0
k	Hour in day (1 - 24)	24
K	Hour in AM/PM (0 - 11)	0
h	Hour in AM/PM (1 - 12)	12
mm	Minutes	30
ss	Seconds	55
a	AM or PM	8:00:00AM

Table 7-5 shows examples of custom formats and their effects on a date that is stored as April 15, 2006 12:15:30 PM.

Table 7-5 Examples of custom date-and-time formats

Format pattern	Result of formatting
MM-dd-yy	04-15-06
E, M/d/yyyy	Fri, 4/15/2006
MMM d	Apr 15
MMMM	April
yyyy	2006
W	3 (the week in the month)
w	15 (the week in the year)
DD	105 (the day in the year)
h:mm:ss	12:15:30

Applying a custom string format

You can define a custom string format using special symbols to construct a format pattern. Table 7-6 describes these symbols.

Table 7-6 Symbols for defining custom string formats

Symbol	Description
@	Character placeholder. Each @ character displays a character in the string. If the string has fewer characters than the number of @ symbols that appear in the format pattern, spaces appear. Placeholders are filled from right to left, unless you specify an exclamation point (!) at the beginning of the format pattern.
&	Same as @, except if the string has fewer characters, spaces do not appear.
!	Specifies that placeholders are to be filled from left to right.
>	Converts string characters to uppercase.
<	Converts string characters to lowercase.

Table 7-7 shows example results of custom string format patterns on string data.

Table 7-7 Examples of custom string formats

Format pattern	Data in original format	Result of formatting
(@@@) @@@-@@@@	6175551007 5551007	(617) 555-1007 ( ) 555-1007
(&&&) &&&-&&&&	6175551007 5551007	(617) 555-1007 () 555-1007
!(@@@) @@@-@@@@	6175551007 5551007	(617) 555-1007 (555) 100-7
!(&&&) &&&-&&&&	6175551007 5551007	(617) 555-1007 (555) 100-7
!(@@@) @@@-@@@@ + ext 9	5551007	(555) 100-7 + ext 9
!(&&&) &&&-&&&& + ext 9	5551007	(555) 100-7 + ext 9
>&&&-&&&&&&-&&	D1234567xy	D12-34567-XY
<&&&-&&&&&&-&&	D1234567xy	d12-34567-xy

Working with predefined data formats

When you use an information object data source to create a BIRT report, Report Studio translates any predefined Actuate data formats to BIRT formats as described in the following section. Translation of data formats does not occur when you use a BIRT data object data source because data objects use BIRT data formats, which are compatible with Report Studio.

Working with a predefined number format

Table 7-8 shows examples of how Report Studio translates predefined numeric data formats.

Table 7-8 Working with predefined numeric formats

Predefined Actuate format	Report Studio format
General number	General Number
Currency	##,##0.00
Fixed	Fixed
Standard	Standard
Percent	0.00%
Scientific	Scientific

Working with a predefined data-and-time format

Table 7-9 shows examples of how predefined date-and-time formats in the English (United States) locale, are translated by Report Studio.

Table 7-9 Working with predefined date-and-time formats in the English (United States) locale

Predefined Actuate format	Data in original format	Report Studio format
General date	04/15/2006	General date
Long date	Thursday, April 15, 2006	Long time
Medium date	15-Apr-06	Medium date
Short date	04/15/06	Short date
Long time	12:00:00 AM	Long time
Medium time	12:00 AM	Medium time
Short time	00:00	Short time
Short week	W16 2006	"W"w yyyy
Short month	4/2006	M/yyyy
Long year	2006	yyyy

Table 7-10 shows examples of the effects of predefined custom format patterns on a date stored as 04/15/2006 in the data source.

Table 7-10 Working with predefined custom date-and-time format patterns

Predefined Actuate format	Data in original format	Report Studio format
mm-dd-yy	04-15-06	MM-dd-yy
ddd, m/d	Thu, 4/15	E, M/d
dddd, m/dd/yy	Thursday, 4/15/06	EEEE, M/dd/yy
mmm d	Apr 15	MMM d
mmmm	April	MMMM
''Quarter'' Q	Quarter 2	'Quarter' q
''Day'' y	Day 106	'Day' D

If an entry is not described, Report Studio translates that format to the default format. Report Studio does not convert predefined formats for other types of data, such as string data and Boolean data, and the resulting data is displayed in the default format.

Formatting data based on conditions

Often, it is useful to modify the format of data when a certain condition is true. This type of formatting is called conditional formatting. For example, you can display sales numbers in red if the value is below target, and in black if the value is above target.

You also can change the format of data in a column according to the values in another column. For example, in a report that shows customer names and the number of days each customer's invoice is past due, you can highlight in blue any customer name that has an invoice past-due value that is between 60 and 90 days. Then, you can highlight in red and bold any customer name that has an invoice past-due value that is greater than 90 days.

Specifying a condition

To use conditional formatting, create a rule defining when and how to change the appearance of data. Only the data in columns supports conditional formatting. The condition part of a conditional formatting rule is an If expression that must evaluate to True. For example:

```
If the order total is less than 1000
If the customer credit limit is between 10000 and 20000
```

How to set conditional formats

1 Select the column containing the data you want to format.

2 Choose Format➛Conditional Formatting from the context menu.

3 In Conditional Formatting, create a rule to specify:

- The format to apply. Choose Format to select formatting options.
- The condition that must be true to apply the format, for example, Profit Greater than or Equal to 2000. For more information about specifying a condition, see the next section.

Figure 7-5 shows an example of a rule specified for a selected column, Profit.

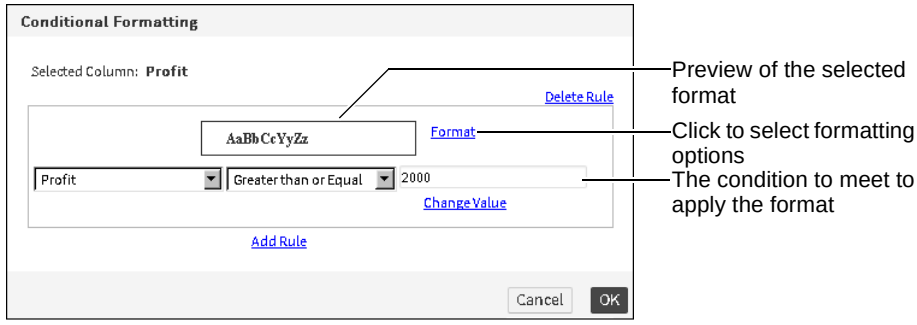


Figure 7-5 Conditional Formatting displaying a rule

4 Choose OK. Figure 7-6 shows the conditional formatting applied to the report. In the Profit column, numbers greater than 2000 are displayed in bold. If the column contains aggregate data, aggregate values do not reflect the applied conditional formatting properties.

Sales Office	San Francisco		
Product Line	Product Name	Total	Profit
Classic Cars			
	1948 Porsche 356-A Roadster	$3,215.52	$628.32
	1956 Porsche 356A Coupe	$6,534.41	$1,914.31
	1957 Corvette Convertible	$4,151.52	$1,983.69
	1961 Chevrolet Impala	$1,766.40	$1,022.81
	1968 Dodge Charger	$5,298.72	$1,691.04
	1968 Ford Mustang	$7,273.14	**$3,268.86**
	1969 Dodge Charger	$3,005.56	$1,302.39
	1969 Dodge Super Bee	$2,967.30	$760.05
	1970 Plymouth Hemi Cuda	$1,742.88	$976.80
	1971 Alpine Renault 1600s	$1,405.35	$363.69
	1976 Ford Gran Torino	$5,864.88	**$2,778.30**
	1982 Lamborghini Diablo	$687.20	$362.40

Figure 7-6 A BIRT design displaying conditional formatting

Comparing to a literal value

The conditional expression shown in Figure 7-7 compares each value in the Profit column to literal values that you type. Alternatively, you can select from a list of values from the Profit column. Selecting from a list of values is useful if the comparison value is a product name, and you do not know the exact product

names, or if the comparison value is a date, and you do not know the date format to type. If the comparison value is a date, Report Studio also provides a calendar tool, which you can use to select a date.

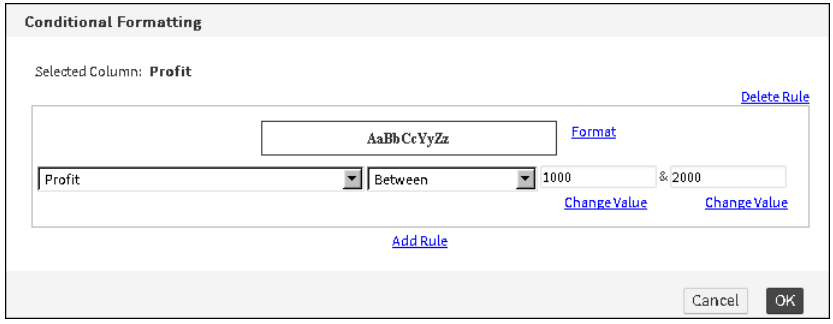


Figure 7-7 Defining a condition that uses the Between operator

How to select a comparison value from a list of values

1. On Conditional Formatting, below the field that takes a comparison value, choose Change Value.
2. In Value, select Specify literal value, and choose Select Values. The values in the selected column appear, as shown in Figure 7-8. This example shows values in a profit column.

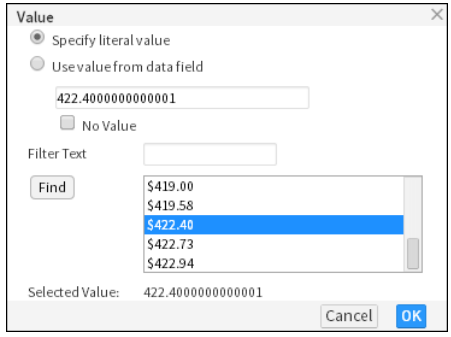


Figure 7-8 Selecting a comparison value

3. If there are too many values in the list, you can type a string in Filter Text to search for values that begin with that string. For example, you can type 18 to view all profit values that begin with 18. You cannot search for strings that appear in the middle of a name.
4. Select a value from the list, then choose OK. The value appears in the comparison value field on Conditional Formatting.

Comparing to a value in another column

In a conditional expression, you can compare the values of one column with the values of another column. Figure 7-9 shows a condition comparing the sale price value with the MSRP value. If the sale price value is greater, the product name appears in bold and underlined.

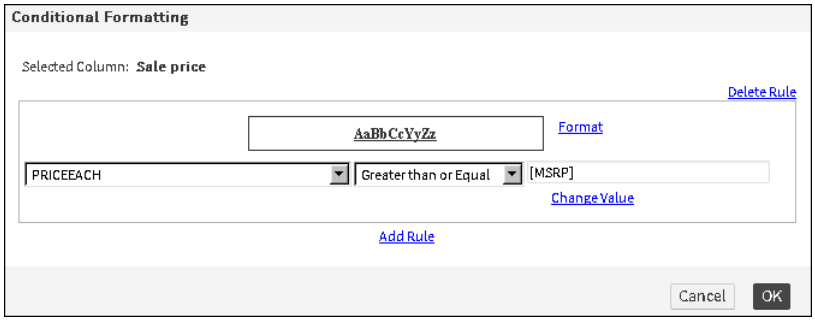


Figure 7-9 Creating a rule that compares values in two columns

How to compare to a value in another column

1. In Conditional Formatting, choose Change Value.
2. In Value, select Use value from data field. A list of columns used in the report appears.
3. Select a column from the list, then choose OK. Conditional Formatting displays the column name in the comparison value field.

   Figure 7-10 shows the BIRT design with conditional formatting applied.

Product Line	Product Name	Sale price	MSRP
Classic Cars			
	1961 Chevrolet Impala	$75.18	$80.84
	1976 Ford Gran Torino	$123.47	$146.99
	1970 Dodge Coronet	**$57.80**	$57.80
	1957 Ford Thunderbird	$66.99	$71.27
	1969 Chevrolet Camaro Z28	**$85.61**	$85.61
	1971 Alpine Renault 1600s	$55.11	$61.23
	1976 Ford Gran Torino	$139.64	$146.99

Figure 7-10 A BIRT design with conditional formatting

Specifying multiple conditional formatting rules

You can create up to three conditional formatting rules for a single column, evaluated in the order in which they appear in the list of rules. You can, for

example, create three rules to set the values of a profit column to one of three colors, depending on the dollar amount. Figure 7-11 shows an example.

When creating multiple rules for a column, be careful that the conditions do not cover overlapping values.

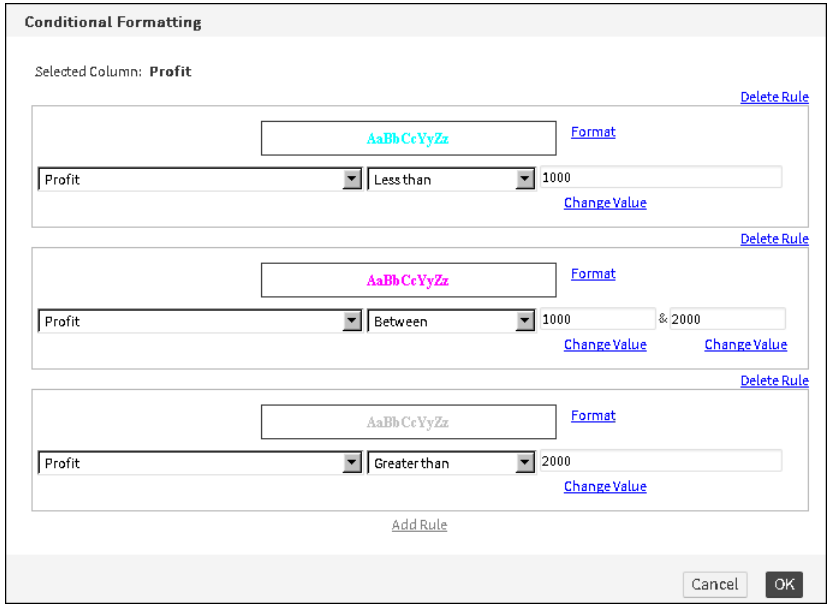


Figure 7-11 Defining multiple conditional formatting rules

Managing columns

You can change the order of the columns in a table at any time. You can also hide columns, and display hidden columns in a report table.

How to change the order of columns

To change the order of columns in a BIRT design, complete the following steps:

1. Select and right-click a column. Choose Column➛Reorder Columns.
2. In Reorder Columns, shown in Figure 7-12, select each column to move.
3. Use the arrows to move the column into the new position. Moving a column up the list moves the column to the left in the table.

   Choose OK. The BIRT design displays the columns in the order you specified.

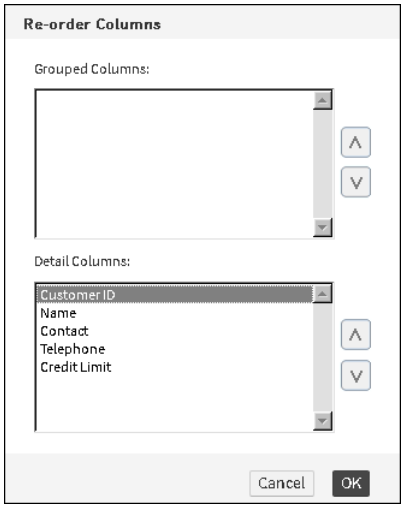


Figure 7-12 Changing the order of columns

How to hide a column

Select and right-click a column. Choose Column➛Hide Column. Report Studio displays the report without the selected column.

How to display a hidden column

1. Select and right-click a column. Choose Column➛Show Column. Show Column lists the hidden columns, as shown in Figure 7-13.
2. In Pick Hidden Column, select the column to display. Choose OK. The column appears in the report.

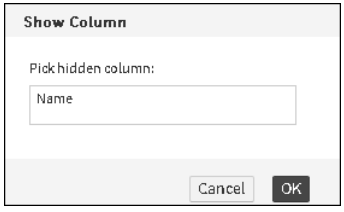


Figure 7-13 Selecting a hidden column to display

Merging data into a single column

You can merge the data from two or more columns into one column. When you merge data, the data appears on multiple lines. Merging data also enables you to include more columns in a BIRT design without exceeding the width of a page. The BIRT design on the left in Figure 7-14 shows a report with data from the

address field spanning four columns. The report on the right in Figure 7-14 displays data from the address fields merged in a single column.

Customer	Phone	AddressLine1	City	State	Zip
American Souvenirs Inc	(203) 555-7845	149 Spinnaker Dr.	New Haven	CT	97823
Auto-Moto Classics Inc.	(617) 555-8428	16780 Pompton St.	Brickhaven	MA	58339
Boards & Toys Co.	(310) 555-2373	4097 Douglas Av.	Glendale	CA	92561
Cambridge Collectables Co.	(617) 555-5555	4658 Baden Av.	Cambridge	MA	51247
Classic Gift Ideas, Inc	(215) 555-4695				
Classic Legends Inc.	(212) 555-8493				
Collectable Mini Designs Co.	(760) 555-8146				
Collectables For Less Inc.	(617) 555-8555				
Corporate Gift Ideas Co.	(650) 555-1386				

Customer	Phone	AddressLine1 City State Zip
American Souvenirs Inc	(203) 555-7845	149 Spinnaker Dr. New Haven CT 97823
Auto-Moto Classics Inc.	(617) 555-8428	16780 Pompton St. Brickhaven MA 58339
Boards & Toys Co.	(310) 555-2373	4097 Douglas Av. Glendale CA 92561
Cambridge Collectables Co.	(617) 555-5555	4658 Baden Av. Cambridge MA 51247

Figure 7-14 Comparing address data displayed in multiple columns and in a merged column

How to merge data into one column

1. Press Ctrl and select each column that contains the data to merge.
2. Right-click and choose Column➛Merge Columns, as shown in Figure 7-15.

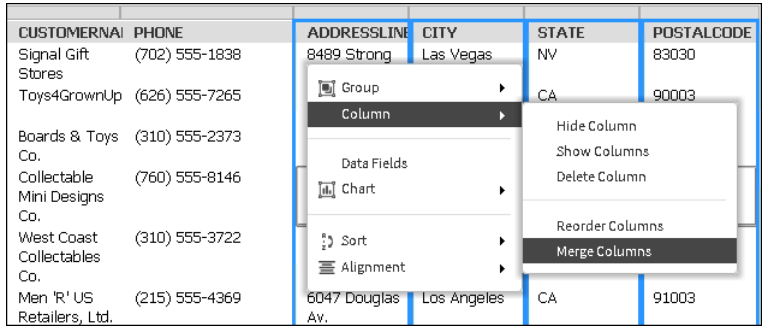


Figure 7-15 Merging columns

When you merge data from multiple columns, the column headers appear on multiple rows, as shown in Figure 7-14.

You can improve the format by merging the column headers to remove the City, State, and Zip column headers, and editing the remaining column header title. Figure 7-16 shows the improved format.

Customer	Phone	Address
Signal Gift Stores	(702) 555-1838	8489 Strong St. Las Vegas NV 83030
Toys4GrownUp	(626) 555-7265	78934 Hillside Dr. Pasadena CA 90003
Boards & Toys Co.	(310) 555-2373	4097 Douglas Av. Glendale CA 92561
Collectable Mini Designs Co.	(760) 555-8146	361 Furth Circle San Diego CA 91217

Figure 7-16 A BIRT design displaying merged column headers in a single row

How to merge column headers

1 Select and right-click the column header in the bottom row, as shown in Figure 7-17. Choose Cell➛Merge Up.

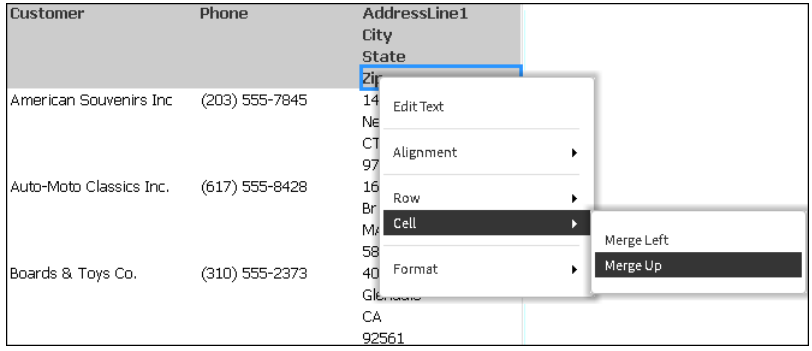


Figure 7-17 Merging column headers

2 Repeat step 1 until only one column header remains.

In Report Studio, the actions you can perform on a merged column include modifying font, specifying conditional formatting rules, formatting data strings, creating filters, and so on, similar to actions you can perform on an unmerged column.

When working with a merged column, select and right-click the column, then choose a modification option. Select Data Item appears, as shown in Figure 7-18. The drop-down list contains a list of columns in the merged column.

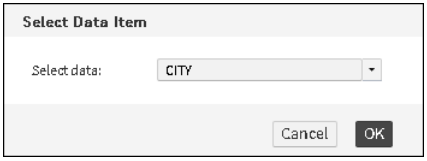


Figure 7-18 Selecting a column from the list of merged columns

In Select data, select a column for which you want to perform an action, such as formatting, or filtering. Choose OK.

Perform the modification action, and then repeat the previous step for every column in the merged column for which you want to perform an action.

Adding a new column header row

If you need to add more text or more space in the header area, you can add multiple column header rows. Figure 7-19 shows a row with text added above the default column header row.

U.S. Customers: New Accounts signed in quarters 1 and 2, 2012					
Customer	Phone	Street Address	City	State	Zip
American Souvenirs Inc	(203) 555-7845	149 Spinnaker Dr.	New Haven	CT	97823
Auto-Moto Classics Inc.	(617) 555-8428	16780 Pompton St.	Brickhaven	MA	58339
Boards & Toys Co.	(310) 555-2373	4097 Douglas Av.	Glendale	CA	92561
Cambridge Collectables Co.	(617) 555-5555	4658 Baden Av.	Cambridge	MA	51247
Classic Gift Ideas, Inc	(215) 555-4695	782 First Street	Philadelphia	PA	71270
Classic Legends Inc.	(212) 555-8493	5905 Pompton St.	NYC	NY	10022
Collectable Mini Designs Co.	(760) 555-8146	361 Furth Circle	San Diego	CA	91217
Collectables For Less Inc.	(617) 555-8555	7825 Douglas Av.	Brickhaven	MA	58339
Corporate Gift Ideas Co.	(650) 555-1386	7734 Strong St.	San Francisco	CA	94217

Figure 7-19 A BIRT design displaying text in a row above the column header row

When you insert a column header row, to be able to display text that spans multiple columns, as shown in Figure 7-19, you must merge the columns in that row. As Figure 7-19 shows, you also can add a border to the new row.

How to add a new row

1. Select and right-click a column header. Choose Row.
2. To add a row above the selected column header, choose Insert Row Above. To add a row below the selected column header, choose Insert Row Below.

A new row appears in the position you specified. Figure 7-20 shows a new row inserted above the default column header row. The row has the same number of columns and the same column widths as the row that follows.

Figure 7-20 Inserting a new row above or below the column header row

How to merge column headers to type text that spans multiple columns

1 Select and right-click the column header. Choose Cell➛Merge Right, as shown in Figure 7-21. The first cell merges with the second cell to become a single, wider cell.

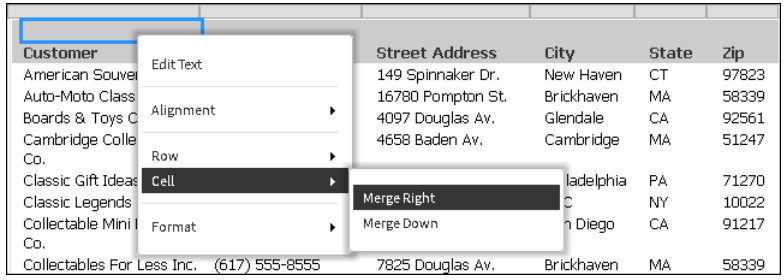
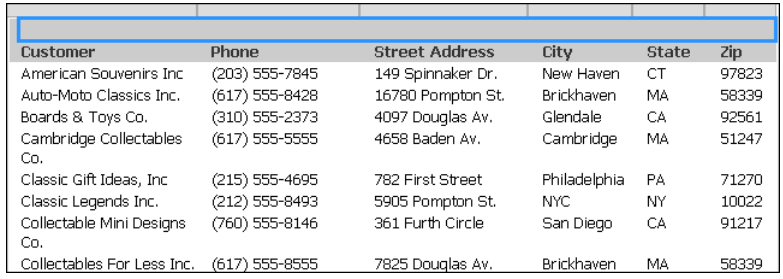


Figure 7-21 Merging column headers

2 Repeat step 1 to merge all cells in the column. Figure 7-22 shows the selection of a single cell, created by merging six cells.



Customer	Phone	Street Address	City	State	Zip
American Souvenirs Inc	(203) 555-7845	149 Spinnaker Dr.	New Haven	CT	97823
Auto-Moto Classics Inc.	(617) 555-8428	16780 Pompton St.	Brickhaven	MA	58339
Boards & Toys Co.	(310) 555-2373	4097 Douglas Av.	Glendale	CA	92561
Cambridge Collectables Co.	(617) 555-5555	4658 Baden Av.	Cambridge	MA	51247
Classic Gift Ideas, Inc	(215) 555-4695	782 First Street	Philadelphia	PA	71270
Classic Legends Inc.	(212) 555-8493	5905 Pompton St.	NYC	NY	10022
Collectable Mini Designs Co.	(760) 555-8146	361 Furth Circle	San Diego	CA	91217
Collectables For Less Inc.	(617) 555-8555	7825 Douglas Av.	Brickhaven	MA	58339

Figure 7-22 Result of merging all the column headers

3 To display text in this cell, double-click in the cell, type the text, then press Enter.

4 To add borders:

1 Select and right-click the cell. Choose Format➛Border.

2 On Border, specify the type of border or borders to add. You can set the border style, color, and width. Figure 7-23 shows the bottom border set to create a solid white border that is one pixel wide. Choose OK.

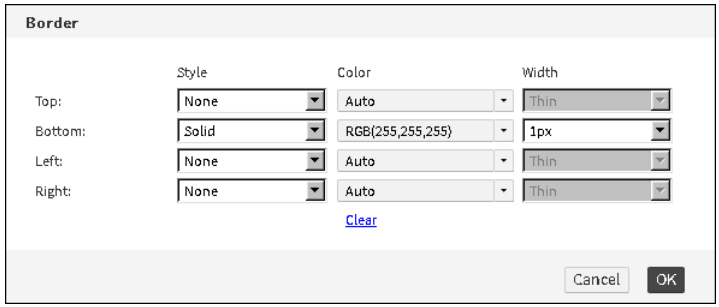


Figure 7-23 Specifying the border type

Chapter

8

Inserting calculated data

This chapter contains the following topics:

- About calculated data
- Creating a computed column
- Adding data fields for an expression
- Writing expressions

About calculated data

Most business reports require calculations to track sales, finances, inventory, and other critical business activities. Some of this calculated data can be included in the data set. Often, however, a data set does not provide all the data you want to display in your report. In this case, you can create your own calculations by creating a new field called a computed column. Figure 8-1 shows a BIRT design that uses a computed column, Total, to display the total for each order line item. In this example, the Total values need to be calculated because the data set does not include the total.

Sales office	Product line	Product name	Price each	Quantity ordered	Total sales
NYC	Motorcycles	1969 Harley Davidson Ultimate Chopper	81.35	30	2440
NYC	Motorcycles	2002 Suzuki XREO	134.05	30	4021
NYC	Motorcycles	1997 BMW R 1100 S	104.81	30	3144
NYC	Motorcycles	1969 Harley Davidson Ultimate Chopper	89	34	3026
NYC	Motorcycles	1996 Moto Guzzi 1100i	115.37	34	3922
NYC	Motorcycles	1936 Harley Davidson El Knucklehead	50.27	34	1709

Figure 8-1 Displaying a computed column, Total, in a BIRT design

Creating a computed column

When you create a computed column, you write an expression, which is a statement that indicates how to calculate the data. In the report in Figure 8-1, each value in the Total column is calculated by multiplying the value in the QUANTITYORDERED field with the value in the PRICEEACH field.

Figure 8-2 shows the computed column, Total, using the following expression:

```
[PRICEEACH]*[QUANTITYORDERED]
```

When you refer to a data field in an expression, you must enclose the field name within brackets ([ ]). Field names are case-sensitive.

Report Studio supports typical mathematical operations, such as addition, subtraction, multiplication, and division. Computed columns, however, are not limited to mathematical calculations. Report Studio also supports many functions for manipulating date-and-time and string data. A function is a set of instructions that do something and return a result. For example, if a CustomerName field

contains values with leading or trailing blank characters, you can remove the blank characters by using the TRIM( ) function as follows:

```
TRIM([CustomerName])
```

In this example, [CustomerName] is the input value, or argument, you supply to the TRIM( ) function to tell the function to trim the values in the CustomerName field.

Report Studio also enables you to create aggregate data for the values in a computed column. For descriptions of the supported functions, see Chapter 13, "Functions and operators."

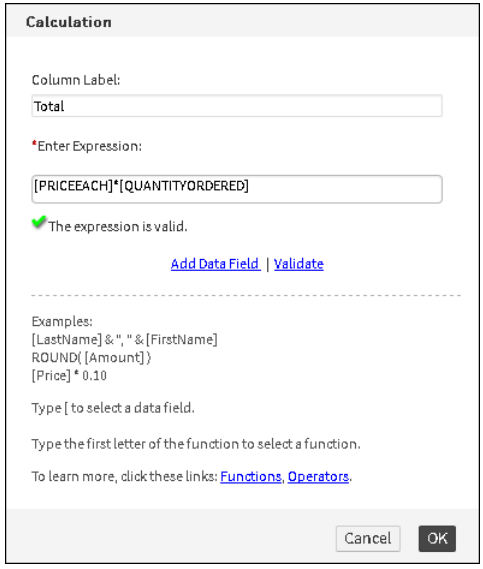


Figure 8-2 An expression for the computed column

How to create a computed column

1. Select the column to the left of the new computed column you want to insert.
2. On the toolbar, choose New Computed Column.
3. In Calculation, type a name in Column Label for the computed column. The name you specify appears in the column header.
4. In Enter Expression, type the expression to calculate the values you want to display:
   - To use a data field in the expression, type the left bracket ([), then select a field from the list that appears, as shown in Figure 8-3.

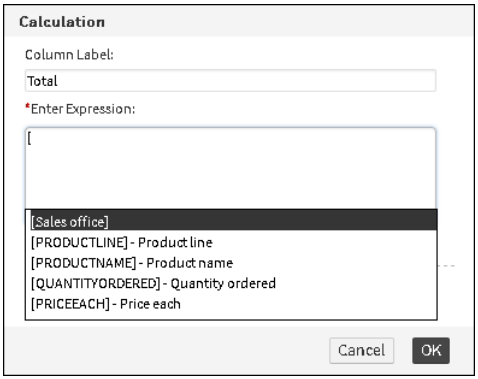


Figure 8-3 Selecting a data field to use in an expression

The list shows only the fields in use in the BIRT design. It does not show all the fields in the data set. To use a field that is not in the list, you must add the field to the BIRT design.

- To use a function, type the first letter of the function, then select a function from the list that appears, as shown in Figure 8-4. The functions indicate the arguments, if any, you need to supply.

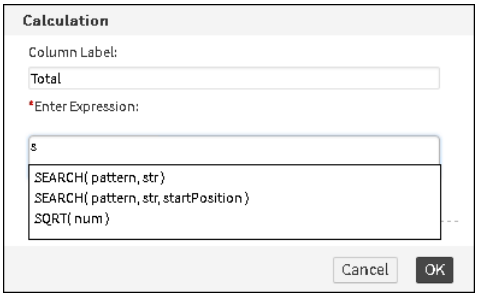


Figure 8-4 Selecting a function to use in an expression

5. When you finish building the expression, choose Validate. If the expression is syntactically correct, the message, The Expression is valid appears. If the expression contains an error, a message that describes the error appears.
6. After you validate the expression, choose OK. The computed column appears in the BIRT design.

Adding data fields for an expression

It is common to use a data field in an expression for a computed column. As mentioned earlier, a computed column only has access to data fields that are used in the BIRT design. Sometimes, however, you need to write an expression that

uses a field provided by the data set, but you do not want to display the field values in the report.

For example, if you insert a CustomerName field and a Phone field in a table, then you insert a computed column, the computed column only has access to the CustomerName and Phone fields. You cannot create an expression that combines, for example, values from the AddressLine1, City, State, and PostalCode fields. To create such a computed column, you must first add the data fields to the table, without actually using the fields in the table.

You can use the data fields you add to perform the following actions in Report Studio:

- Filtering data using the Advanced Filter dialog box
- Applying a conditional format
- Representing data graphically in a chart

How to add a data field

1 Right-click the table handle. Choose Data Fields, as shown in Figure 8-5.

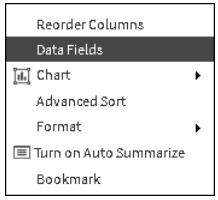


Figure 8-5 Adding a data field to a table

Data Fields appears. Figure 8-6 shows an example of Data Fields displaying the data fields currently used in the table.

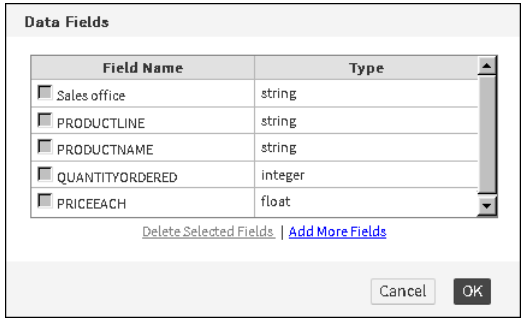


Figure 8-6 Data Fields displaying the fields currently used in the table

2 Choose Add More Fields. Data Set displays all the fields in the data set, as shown in Figure 8-7.

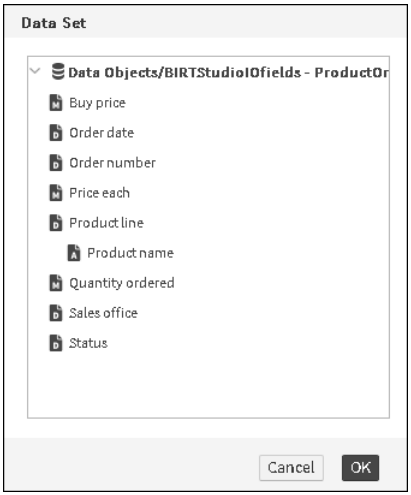


Figure 8-7 Data Set displaying all the available fields

3. Select the field to add. To add multiple fields, press Ctrl as you select each field. Choose OK.
4. On Data Fields, choose OK. The selected fields are available to use in any expression.

To remove data fields not used in a BIRT design, deselect each data field. If you are in the process of defining an expression for a computed column, you can choose Add Data Field, in the Calculation dialog box, then follow steps 2 through 4 to add fields.

Writing expressions

An expression can contain any combination of literal values, operators, functions, and references to data fields.

Using numbers and dates in an expression

When you create an expression that contains a literal number or a literal date, type the number or date according to the conventions of the English (United States) locale. In other words, for a number, use a period (.), not a comma (,) as the decimal separator, and for a date, type 03/12/2007 to represent March 12, 2007, even if you are working in, for example, the French (France) locale. For example:

```
Correct: ([Quantity] * [Price]) * 1.5
Incorrect: ([Quantity] * [Price]) * 1,5
```

Enclose literal date values in double quotation marks (" "), as shown in the following expression, which calculates the number of days from the order date to Christmas:

```
DIFF_DAY([OrderDate], "12/25/08")
```

Using reserved characters in an expression

Some characters are reserved for internal use and have a special meaning. For example, Report Studio uses brackets to denote a data field. The following characters are reserved in Report Studio:

```
[
]
?
' (single quotation mark)
```

If the name of a data field contains a reserved character, Report Studio encloses the reserved character in single quotation marks (') when you select the data field for use in an expression, for example, `'['`. If the name of a data field is OBSOLETE?, Report Studio changes it to [OBSOLETE'?'] in the expression. If you type [OBSOLETE?] in the expression, the dialog box displays an error message.

To minimize syntax errors, select the field from the list in the Calculation dialog box and allow the software to construct the expression, instead of typing it yourself. The following examples show the appearance of data fields containing reserved characters in the Calculation dialog box. The examples show both versions of the names, the changed name and the original name with reserved characters, as follows:

```
[ORDER'''S STATUS] - ORDER'S STATUS
[PRODUCTCODE'['4-digit']'] - PRODUCTCODE[4-digit]
[OBSOLETE'?'] - OBSOLETE?
```

Chapter

9

Organizing data in a report

This chapter contains the following topics:

- Sorting data
- Organizing data in groups
- Organizing data in sections
- Suppressing duplicate values
- Starting each group or section on a new page

Sorting data

When you insert data in a BIRT design, data rows appear in the sort order specified in the data set, if a sort order is specified. If no sort order is defined, data rows appear in the order in which they were added to the database. Using Report Studio, you can arrange the data rows in a meaningful order by sorting the data. Compare the reports in Figure 9-1.

Country	Customer	Credit Limit
France	Atelier graphique	21000
USA	Signal Gift Stores	71800
Australia	Australian Collectors, Co.	117300
France	La Rochelle Gifts	118200
Norway	Baane Mini Imports	81700
USA	Mini Gifts Distributors Ltd.	210500
Poland	Havel & Zbyszek Co	0
Germany	Blauer See Auto, Co.	59700
USA	Mini Wheels Co.	64600
USA	Land of Toys Inc.	114900
Spain	Euro+ Shopping Channel	227600

Country	Customer	Credit Limit
Australia	Australian Collectors, Co.	117300
Canada	Canadian Gift Exchange Network	90300
Canada	Québec Home Shopping Network	48700
Denmark	Danish Wholesale Imports	83400
Denmark	Heintze Collectables	120800
Finland	Toys of Finland, Co.	96500
France	Atelier graphique	21000
France	La Rochelle Gifts	118200
France	Saveley & Henriot, Co.	123900

Figure 9-1 Displaying unsorted and sorted data in BIRT designs

The report on the left displays the data rows as they exist in the data set. You can sort data in ascending or descending order, and you can sort data by multiple columns. The report on the right displays the same data sorted by country in alphabetical order.

How to sort data on a single column

To sort data on a single column, select and right-click the column. Choose Sort➛Sort Ascending or Sort➛Sort Descending.

You can sort data by as many as three columns, using Advanced Sort as shown in Figure 9-2.

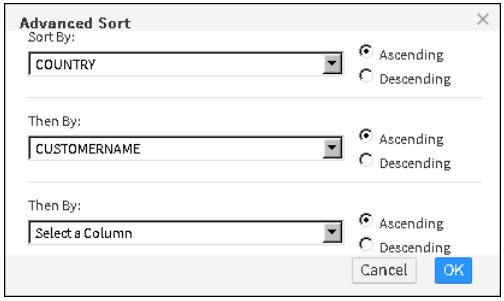


Figure 9-2 Specifying advanced sorting

When sorting data on multiple columns, consider the order of precedence for the sort action. In Advanced Sort, select the columns in the order in which to sort data. For example, to sort data by city first, then by customer name, you must select the columns in that order on Advanced Sort.

How to sort data on multiple columns

1. Select and right-click a column. Choose Sort➛Advanced Sort.
2. In Advanced Sort, select a column from the first drop-down list, and choose either Ascending or Descending order.
3. Select another column from the second drop-down list, and choose the sort order.
4. Optionally, select a third column on which to sort.

How to restore data to its original order

To restore data to its original, unsorted order, complete the following steps.

1. Select and right-click a column. Choose Sort➛Advanced Sort.
2. In Advanced Sort, for each column in Sort by containing a defined sort order, select Select a Column from the drop-down list. Choose OK.

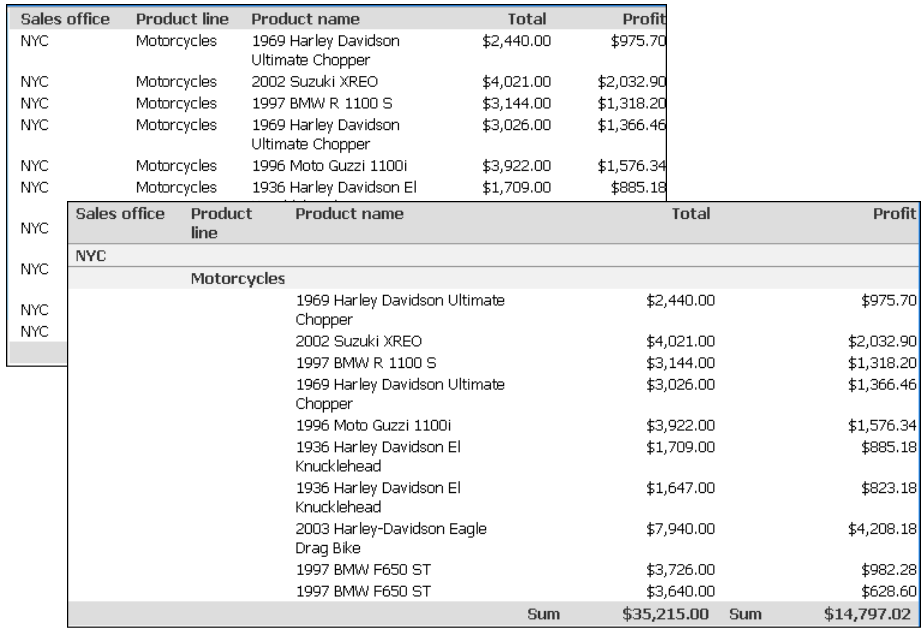
Organizing data in groups

Data groups contain related data rows. For example, you can create a report that lists items by category—all office furniture in one group, all computer hardware in another group, all computer software in a third group, and so on. Organizing data in groups makes it easier to compare and analyze information.

Compare the reports in Figure 9-3. The BIRT design on the left shows the data in a simple list. The data rows are sorted by sales office, then by product line. The BIRT design on the right groups the rows by sales office then by product line. Data appears in a hierarchy without repeated values for office names and product lines. In addition, totals, displayed in italics, appear at the end of each product line and sales office group.

When you group data, you can:

- Add subtotals, counts, averages, or other aggregate information at the beginning or end of each group.
- Insert a page break before or after each group to start each group of data on a new page.
- Hide the details of each group to view a summary report.



Sales office	Product line	Product name	Total	Profit
NYC	Motorcycles	1969 Harley Davidson Ultimate Chopper	$2,440.00	$975.70
NYC	Motorcycles	2002 Suzuki XREO	$4,021.00	$2,032.90
NYC	Motorcycles	1997 BMW R 1100 S	$3,144.00	$1,318.20
NYC	Motorcycles	1969 Harley Davidson Ultimate Chopper	$3,026.00	$1,366.46
NYC	Motorcycles	1996 Moto Guzzi 1100i	$3,922.00	$1,576.34
NYC	Motorcycles	1936 Harley Davidson El	$1,709.00	$885.18

Sales office	Product line	Product name	Total	Profit
NYC				
	Motorcycles			
		1969 Harley Davidson Ultimate Chopper	$2,440.00	$975.70
		2002 Suzuki XREO	$4,021.00	$2,032.90
		1997 BMW R 1100 S	$3,144.00	$1,318.20
		1969 Harley Davidson Ultimate Chopper	$3,026.00	$1,366.46
		1996 Moto Guzzi 1100i	$3,922.00	$1,576.34
		1936 Harley Davidson El Knucklehead	$1,709.00	$885.18
		1936 Harley Davidson El Knucklehead	$1,647.00	$823.18
		2003 Harley-Davidson Eagle Drag Bike	$7,940.00	$4,208.18
		1997 BMW F650 ST	$3,726.00	$982.28
		1997 BMW F650 ST	$3,640.00	$628.60
		Sum	$35,215.00	Sum $14,797.02

Figure 9-3 A BIRT design displaying data grouped by sales office and product line

In addition, Report Studio completes the following actions when you group data:

- Removes duplicate values.
- Sorts the values of each group. For example, a product line group displays the product lines in alphabetical order (Classic Cars to Vintage Cars), as shown in Figure 9-3.
- Generates a table of contents when you view the finished report in Actuate Viewer. The table of contents, which displays the group values, supports navigating to specific locations in the report.

How to group data

1. Select and right-click the column that contains the data to group.
2. Choose Group➛Add Group.

If the column you select contains string or numeric data, Report Studio groups the data by each unique value in the column. If the column you select contains date-and-time data, you have additional grouping options, described in the following section.

When you group data in a date-and-time column, you can show every individual date or time value, or you can group the data by a specific time interval. The

second option is more typical. A shipping report, for example, can organize shipment data by month or by quarter, rather than by date.

Figure 9-4 shows three BIRT designs as follows:

- Displaying data that has not been grouped
- Containing shipment dates grouped using individual values
- Containing shipment dates grouped by month

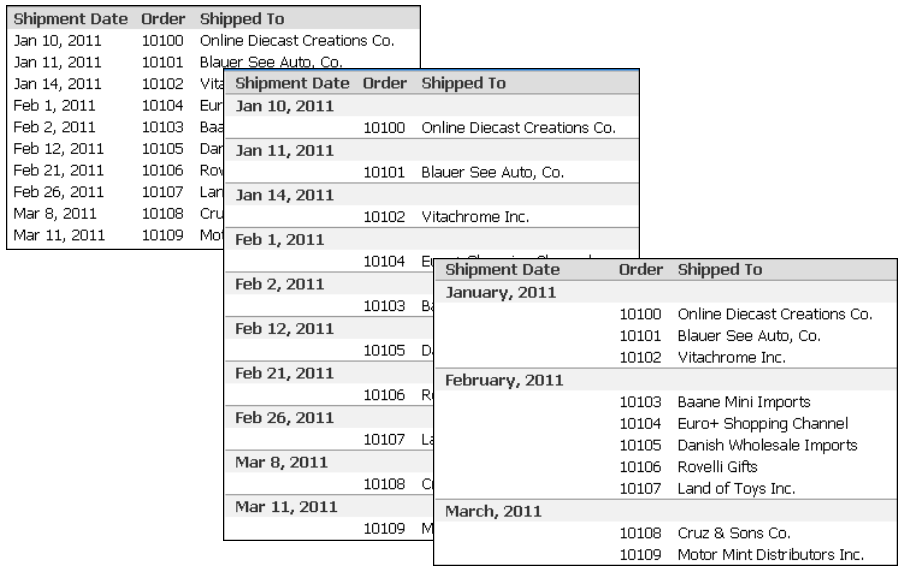


Figure 9-4 Comparing grouping options for date-and-time data

How to group date-and-time data

1. Select and right-click the column that contains the date-and-time values to group.
2. Choose Group➛Add Group.
3. In Group Details, do one of the following:
   - Select Group using individual values.
   - Select Group every, and provide the following information:
     - Select an interval type, such as weeks, months, or quarters, from the drop-down list.
     - Type a number by which to group the selected interval type. For example, if you selected Weeks, type 2 to group data in two-week periods.

Figure 9-5 shows grouping the SHIPPEDDATE column by month.

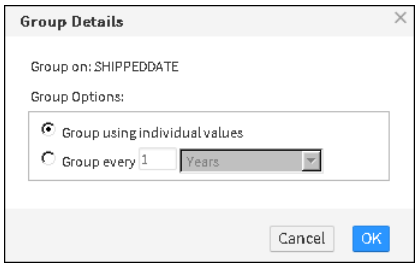


Figure 9-5 Grouping dates by month

Consider order of precedence before creating multiple groups. To group customer data by state, then by city, create the groups in that order. The first group appears as the first column in the table, the second group appears next to it, and so on.

Changing the grouping order

You can also change the grouping order once you create groups in a BIRT design.

How to change the grouping order

1 Select and right-click any column. Then choose Column➛Reorder Columns. Reorder Columns, shown in Figure 9-6, displays the grouped columns in the order in which the BIRT design currently groups the data.

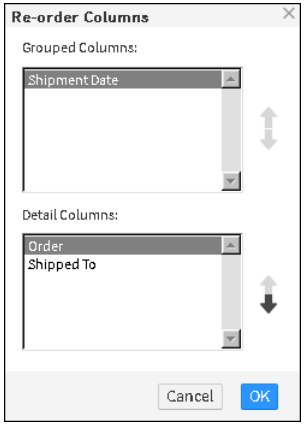


Figure 9-6 Changing the grouping order

2 In Grouped Columns, select a column and use the up or down arrows to move the column up or down the list. Choose OK.

Deleting a group

Deleting a group deletes all information associated with the group. For example, if the BIRT design displays aggregate data at the group level, this data is removed.

How to delete a group

To re-display the values in the detail row, delete a group. Select and right-click the column whose values you want to ungroup. Choose Group➤Delete Group.

Organizing data in sections

You can also organize report data into sections. A section is functionally equivalent to a group. When you create a section, you are also grouping data. Like groups, you can create multiple sections, calculate aggregate data for each section, start each section on a new page, and hide the details of each section.

One primary difference between a section and a group is how the information is arranged. In Figure 9-7, which shows a BIRT design with sections, the sales office and product line values appear above the column headers.

Sales office	NYC		
Product line	Motorcycles		
Product name	Total		Profit
1969 Harley Davidson Ultimate Chopper	$2,440.00		$975.70
2002 Suzuki XREO	$4,021.00		$2,032.90
1997 BMW R 1100 S	$3,144.00		$1,318.20
1969 Harley Davidson Ultimate Chopper	$3,026.00		$1,366.46
1996 Moto Guzzi 1100i	$3,922.00		$1,576.34
1936 Harley Davidson El Knucklehead	$1,709.00		$885.18
1936 Harley Davidson El Knucklehead	$1,647.00		$823.18
2003 Harley-Davidson Eagle Drag Bike	$7,940.00		$4,208.18
1997 BMW F650 ST	$3,726.00		$982.28
1997 BMW F650 ST	$3,640.00		$628.60
Sum	$35,215.00	Sum	$14,797.02

Sales office section value
Product line section value
Column headers
Detail rows

Figure 9-7 Using sections to organize data

Organizing data in sections reduces the overall width of the table.

- You can insert multiple charts, one in each section, to reflect the aggregated data in each section. In a table that contains data groups, you can display only one chart, which presents the aggregated data for the overall table.
- You can display additional data fields in a section heading. By default, a section heading displays only a label and the section value, as shown in the BIRT design in Figure 9-7. The data fields being used in the table are the ones available for addition to a section heading.

You can use both groups and sections in a single BIRT design. Figure 9-8 shows a BIRT design that contains the same data as the previous examples, except the sales office column is a section, and the product line column is a group. If a column contains date-and-time data, you can create sections based on individual date values, or you can create sections that group dates by interval.

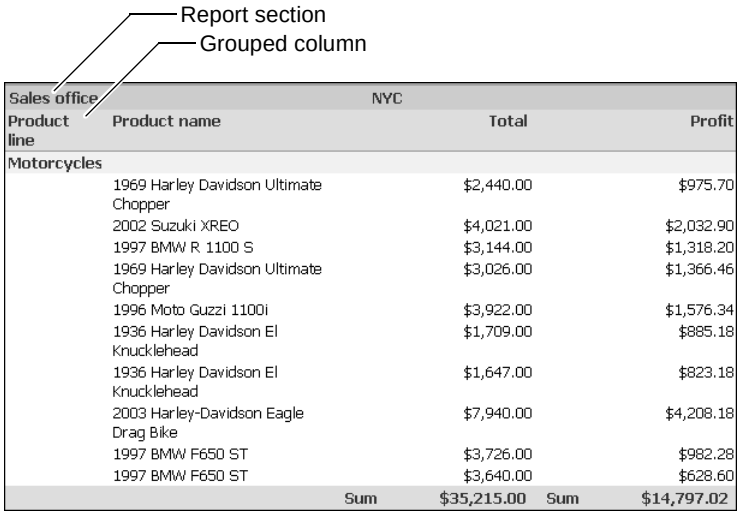


Figure 9-8 Using a group and a section to organize data

How to create a section

1. Select the column that contains the data you want to organize in a section.
2. Choose Group➛Add Section.

How to add content to a section heading

1. Select and right-click the section heading. Choose Section Heading. A dialog box displays a list of the data fields that are in the BIRT design.
2. Select the data field to add to the section heading, as shown in Figure 9-9.

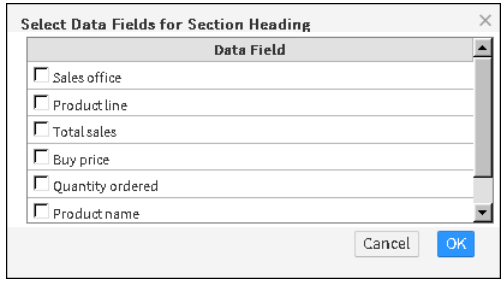


Figure 9-9 Selecting data fields to add to a section heading

3 Choose OK. The data field appears in the section heading.

If you do not see a data field you want to use, add it to the table so that it is available in the Data Field dialog box.

How to delete a section

You can delete a section to reorganize data. When you delete a section, the values in the section do not reappear in the detail rows. Instead, the values appear in a grouped column. Any aggregate data for the section is deleted. Any chart you inserted in the section is also deleted.

To delete a section, select and right-click the section heading, then choose Group➛Delete Section.

Suppressing duplicate values

Sometimes a report column displays duplicate values in consecutive data rows. When the duplication is unnecessary or makes the report difficult to read, it is useful to suppress consecutive duplicate values. You can use Report Studio to suppress duplicate values that appear in a grouped column by moving data rows from the column to the group header.

Avoiding repeated values in a column

In the report shown in Figure 9-10, the Location column shows the state name each time the name occurs.

CUSTOMERNAME	CITY	STATE	SALESREPEMPLOYEENUMBER
Signal Gift Stores	Las Vegas	NV	1166
Toys4GrownUps.com	Pasadena	CA	1166
Boards & Toys Co.	Glendale	CA	1166
Collectable Mini Designs Co.	San Diego	CA	1166
West Coast Collectables Co.	Burbank	CA	1166
Men 'R' US Retailers, Ltd.	Los Angeles	CA	1166
Australian Collectables, Ltd	Glen Waverly	Victoria	1611
Australian Collectors, Co.	Melbourne	Victoria	1611
Anna's Decorations, Ltd	North Sydney	NSW	1611
Souveniers And Things Co.	Chatswood	NSW	1611
Australian Gift Network, Co	South Brisbane	Queensland	1611

Figure 9-10 Viewing duplicate values in columns

As Figure 9-11 shows, the report appears neater and more organized when duplicate values are not repeated.

If a column extends across multiple pages, the first row on each page displays a value, even if duplicate values are suppressed for that column.

CUSTOMERNAME	CITY	STATE	SALESREPEMPLOYEENUMBER
Signal Gift Stores	Las Vegas	NV	1166
Toys4GrownUps.com	Pasadena	CA	
Boards & Toys Co.	Glendale		
Collectable Mini Designs Co.	San Diego		
West Coast Collectables Co.	Burbank		
Men 'R' US Retailers, Ltd.	Los Angeles		
Australian Collectables, Ltd	Glen Waverly	Victoria	1611
Australian Collectors, Co.	Melbourne		
Anna's Decorations, Ltd	North Sydney	NSW	
Souveniers And Things Co.	Chatswood		
Australian Gift Network, Co	South Brisbane	Queensland	

Figure 9-11 Viewing a report with suppressed duplicate values

How to suppress duplicate values in a column

Select and right-click the column containing duplicate values. Choose Column➛Do Not Repeat Values.

How to show hidden duplicate values in a column

Select and right-click a column that does not repeat duplicate values. Choose Column➛Repeat Values.

Avoiding repeated values in a group

In a grouped column containing repeated values, you can avoid repetition by moving the data row values to the group header so that they only appear once.

How to suppress duplicate values in a grouped column

1. Select and right-click the column with the duplicate values. Choose Column➛Move to Group Header.
2. In Move to Group Header, as shown in Figure 9-12, select the group to which you want to move the data values, if the report contains more than one group.

Figure 9-12 Selecting a group header

Choose OK.

Repeat steps 1 and 2 for each report column for which you want to move data rows to the group header. The value from the first data row in each group appears in each group header. The Product Line column displays a single data row for each Customer Number group header, as shown in Figure 9-13.

Customer country	Customer name	Customer ID	Customer credit limit	Product line	Product name
USA					
	Land of Toys Inc.	131	114900		
				Motorcycles	1969 Harley Davidson Ultimate Chopper 1997 BMW R 1100 S 1997 BMW F650 ST 1936 Harley Davidson El Knucklehead
	Microscale Inc.	456	39800		
					2002 Suzuki XREO 2002 Yamaha YZR M1 1982 Ducati 996 R 1974 Ducati 350 Mk3 Desmo
	Mini Classics	319	102700		
					1996 Moto Guzzi 1100i 1936 Harley Davidson El Knucklehead

Figure 9-13 Viewing a report that suppresses duplicate values in a group

Starting each group or section on a new page

Lengthy reports or reports that consist of distinct sections typically look more organized if each section appears on a separate page. As you design a report, make sure you periodically view the generated report to see if you need to set page breaks to make the report more usable. You can set a page break for each group and section you create.

How to set a page break

1 Select and right-click a grouped column or section heading. Choose Group➛Page Break, or Section➛Page Break. Page Break appears, as shown in Figure 9-14.

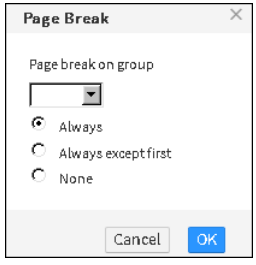


Figure 9-14 Page Break dialog box

2 In Page Break, select After or Before from the drop-down list to insert a page break after or before a group or section.

- If you select After, do one of the following:
  - Choose Always to always insert a page break after each group or section.
  - Choose Always except last to always insert a page break after each group or section, but not after the last one. This is the typical option to avoid a blank page at the end of the report.
- If you select Before, do one of the following:
  - Choose Always to always insert a page break before each group or section.
  - Choose Always except first to always insert a page break before each group or section, but not before the first one. This is the typical option to avoid a blank page at the beginning of the report.
- Choose None to remove an existing page break.

3 Choose OK. Run the report to view the modified design.

Chapter

10

Aggregating data

This chapter contains the following topics:

- About aggregate data
- Hiding details

About aggregate data

One of the key features of any report is the ability to display summary, or aggregate, data. Aggregating data involves performing a calculation on a set of values. The listing BIRT design in Figure 10-1 displays aggregate data for the Total and the Profit columns at the end, or footer, of the table.

Product name		Total		Profit
1969 Harley Davidson Ultimate Chopper		$2,440.00		$975.70
2002 Suzuki XREO		$4,021.00		$2,032.90
1997 BMW R 1100 S		$3,144.00		$1,318.20
1969 Harley Davidson Ultimate Chopper		$3,026.00		$1,366.46
1996 Moto Guzzi 1100i		$3,922.00		$1,576.34
1936 Harley Davidson El Knucklehead		$1,709.00		$885.18
1936 Harley Davidson El Knucklehead		$1,647.00		$823.18
2003 Harley-Davidson Eagle Drag Bike		$7,940.00		$4,208.18
1997 BMW F650 ST		$3,726.00		$982.28
1997 BMW F650 ST		$3,640.00		$628.60
	Max	$7,940.00	Max	$4,208.18
	Avr	$3,521.00	Avr	$1,479.70
	Sum	$35,215.00	Sum	$14,797.02

Aggregate data

Figure 10-1 Displaying aggregate data in a simple listing report

Creating aggregate data

When you aggregate data in a selected column, you specify the following information:

- The type of aggregate calculation. For each column, you can display a maximum of three aggregations.
- Whether to perform the aggregate calculation across all the data rows in the table, or across the data rows in each group, or both.
- Whether to display the aggregate data in the footer or header of the table or the groups.

The aggregate calculations you can perform on a column depend on the column's data type. For descriptions of the supported aggregate functions, see Chapter 13, "Functions and operators."

How to aggregate data

1. Select and right-click the column that contains the data to aggregate.
2. Choose Aggregation. Aggregation appears, as shown in Figure 10-2.
3. In Select Function, select the aggregate function to use.

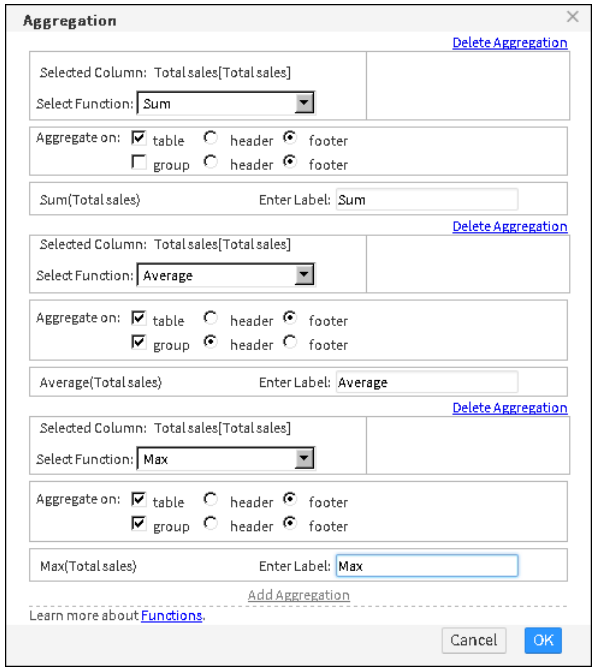


Figure 10-2 Defining three aggregations

4 In Aggregate on, do the following:

- Select table to aggregate data across all the data rows in the table. If you select table, select either header or footer as the location in which to display the aggregate data.
- Select group to aggregate data at the group level. If you select group, select either header or footer as the location in which to display the aggregate data.

5 In Enter Label, type the text to display next to the aggregate value. By default, Report Studio uses the name of the function you selected. You can, for example, replace Max with the following text:

```
Highest value
```

6 If you want to calculate and display a second aggregation, choose Add Aggregation. Repeat steps 3 to 5 to define the next aggregation.

7 Choose OK. Figure 10-2 shows the three aggregations that are defined for the BIRT design in Figure 10-1.

Formatting aggregate values

Using Report Studio, you can format aggregate values in the following ways:

- Specify alignment properties.
- Modify font type, size, color, and style.
- Apply a format to the aggregate values.

Filtering aggregate values

You can use filters to display aggregate values according to certain conditions. Because Report Studio displays only a preview of the actual data, when you perform actions such as aggregating data, or filtering aggregate data values, the resulting BIRT design displays different results in Report Studio and in Actuate Viewer. Report Studio applies the specified aggregation function or filter condition to the previewed data. Always view the BIRT design in Actuate Viewer to verify that the results are what you expect.

When you create a filter condition that excludes certain values, such as viewing transactions that closed over a month ago or listing products that are not the top five selling products, Report Studio recalculates the aggregate data according to the data Report Studio retrieves. In some cases, it is also useful to view aggregate values for the unfiltered data, for example, to perform percentage calculations on this data. To address both situations in detail tables containing aggregate data, Report Studio provides an option in the Filter, Advanced Filter, and Top/Bottom N filter dialog boxes to specify whether to recalculate aggregate data based on the filter condition created, or not.

How to filter aggregate values

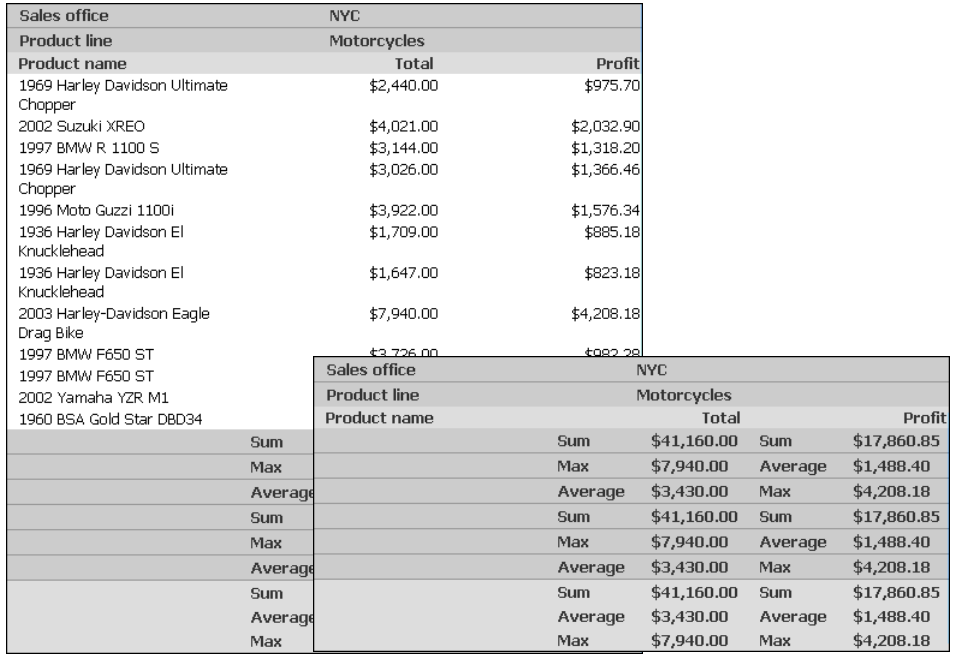
1. In Report Studio, select and right-click the aggregate value. Choose Filter➛Filter, or Filter➛Filter Top/Bottom N.
2. Define a filter condition.

   Report Studio evaluates the condition, and displays the resulting data in the BIRT design.
3. Run the report in Actuate Viewer to verify that the results are what you expect.

Hiding details

When you create a report that organizes data in groups or sections, you can change the appearance of the report to a summary report by hiding the details of a group or section. Hiding details, particularly for a report that runs into hundreds of pages, shows key information at a glance. For reports containing large amounts of aggregate data, you can also create a summary table design, where the aggregate calculations are performed at the data set level. Figure 10-3

shows two BIRT designs that contain the same data. The first design shows all details. The next design hides the details in each product line section.



Sales office	NYC	
Product line	Motorcycles	
Product name	Total	Profit
1969 Harley Davidson Ultimate Chopper	$2,440.00	$975.70
2002 Suzuki XREO	$4,021.00	$2,032.90
1997 BMW R 1100 S	$3,144.00	$1,318.20
1969 Harley Davidson Ultimate Chopper	$3,026.00	$1,366.46
1996 Moto Guzzi 1100i	$3,922.00	$1,576.34
1936 Harley Davidson El Knucklehead	$1,709.00	$885.18
1936 Harley Davidson El Knucklehead	$1,647.00	$823.18
2003 Harley-Davidson Eagle Drag Bike	$7,940.00	$4,208.18
1997 BMW F650 ST	$3,726.00	$982.28
1997 BMW F650 ST		
2002 Yamaha YZR M1		
1960 BSA Gold Star DBD34		
Sum		
Max		
Average		
Sum		
Max		
Average		
Sum		
Average		
Max		

Sales office	NYC			
Product line	Motorcycles			
Product name		Total		Profit
	Sum	$41,160.00	Sum	$17,860.85
	Max	$7,940.00	Average	$1,488.40
	Average	$3,430.00	Max	$4,208.18
	Sum	$41,160.00	Sum	$17,860.85
	Max	$7,940.00	Average	$1,488.40
	Average	$3,430.00	Max	$4,208.18
	Sum	$41,160.00	Sum	$17,860.85
	Average	$3,430.00	Average	$1,488.40
	Max	$7,940.00	Max	$4,208.18

Figure 10-3 Showing and hiding detail rows

How to hide the details of a group or section

1. Select and right-click the grouped column or section heading for which to hide details.
2. Choose Group➛Hide Detail, or Section➛Hide Detail.

How to re-display the details of a group or section

Select and right-click the grouped column or section heading. Choose Group➛Show Detail, or Section➛Show Detail.

Chapter

11

Filtering data

This chapter contains the following topics:

- About data filtering
- Creating a filter
- Prompting for filter values at run time

About data filtering

A data set can provide more information than your report needs. You can select specific data rows to use in a report by using a filter. Filtering data helps you work effectively with large amounts of data to find the pieces of information that answer specific business questions, such as which sales representatives generated the top 10 sales accounts, which products generated the highest profit in the last quarter, which customers have not made a purchase in the past 90 days, and so on. Filtering data in a BIRT design can measurably reduce the load on the database server, improving processing speed, because it reduces the number of data rows retrieved when the BIRT design is run.

Report Studio supports the use of static filters and dynamic filters. Use a static filter to define a filter condition at report design time. The data displayed in the BIRT design depends on the filter condition specified. Use a dynamic filter to prompt a user to specify values at run time. The data that appears in the BIRT design depends on the values the user specifies when generating a BIRT design.

When you use filters in a BIRT design, Report Studio typically evaluates the filter condition against the rows of data previewed in the BIRT design, 50 rows by default. Increase this number to the maximum value of 200 rows when creating filter conditions. If you use the default preview value of 50 data rows to test a filter condition, Report Studio can fail to return any data that matches the filter you define. Run the report in Actuate Viewer to view the actual data, and verify that the result is what you expect.

Creating a filter

A filter condition is an If expression that must evaluate to True in order to include a data row. For example:

```
If the order total is greater than 10000
If the sales office is San Francisco
If the order date is between 4/1/2010 and 6/30/2010
```

Figure 11-1 shows an example of a condition defined in Filter. As the illustration shows, Filter helps you define the condition by breaking it down into the displayed parts.

Specifying filtering options

You can filter data at the data set level and at the table level. Filtering at the data set level narrows the scope of data retrieved from the data set and can improve design-time performance if the data set contains a large amount of data. Filtering at the table level narrows the scope of data displayed in a BIRT design and is the typical filtering option. If a BIRT design contains filters at both the data

set and table levels, Report Studio executes the filter at the data set level first, then at the table level. Design the filters accordingly.

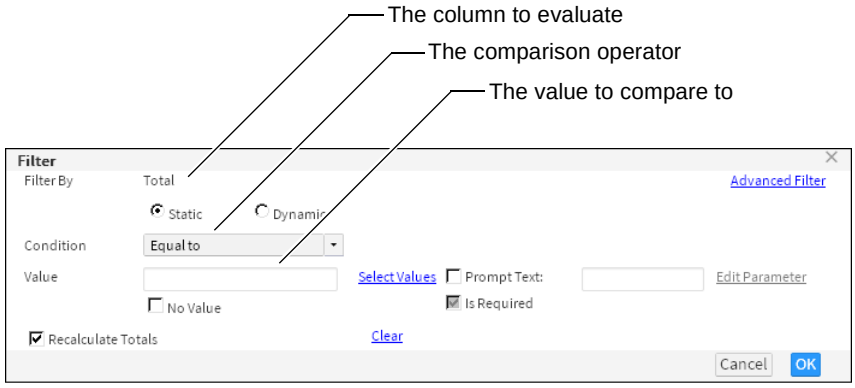


Figure 11-1 Filter displaying a filter condition

When creating a filter condition, users can specify whether or not the aggregate data in the BIRT design is recalculated to meet the filter condition. This feature is useful when comparing the filtered data values with the unfiltered totals, for example, when performing a percentage calculation of the unfiltered aggregate totals.

When you create a filter condition on a column containing Float or Double data type, the In, Not In, Equal to, and Not Equal To operators do not work as expected in Java-based applications. To make sure you obtain the results you expect, do one of the following:

- When using the In or Not In operators in a filter condition specified on a computed column, make sure you round the values in the column to a specified number of digits. For example, the following expression rounds the value obtained by three decimal places:

  ```
  ROUND([dbo_ITEMS:PRICEQUOTE]*[dbo_ITEMS:QUANTITY]*0.001, 3)
  ```

- Use the Between operator in filter conditions in place of the Equal to or Not Equal To operators.

Table 11-1 lists examples of filter conditions.

Table 11-1 Examples of filter conditions

Type of filter condition	Usage	Example
Multiple comparison values	Returns columns that are valid for more than one comparison value.	`Country In USA, UK, France, Japan`

(continues)

Table 11-1 Examples of filter conditions (continued)

Type of filter condition	Usage	Example
Empty or blank values	Tests if a field contains a value or not.	`E-mail Is Null, Email Is Not Null`

Excluding data	Excludes data that fulfills the condition.	`Country Not In USA, UK, France, Japan`
		`Order Amount Not Between 1000 and 5000`
		`Product Code Not Like 'MS%'`

Top or Bottom '*n*' values	Tests if the column value is within the top or bottom '*n*' values. Use at the report table level or at the group level. Use the Top/Bottom N dialog box to modify a group level filter.	`Order Amount Top N 50` `Median Price Bottom Percent 10`
Comparing to a date value	Compares the date-and-time values in a column to a specific date. The value supplied must be in one of the following formats, regardless of your locale: 3/26/2008 3/26/2008 2:30:00 PM Use the calendar icon to select a date.	`Order Date Equal To 3/26/2008` `Shipped Date Equal To 3/26/2008 2:30:00 PM`
Comparing to a string pattern	Tests if each string value in the column matches a string pattern.	`Customer Like M%`
Comparing to a value in another column	Tests values in one column against values in the specified column.	`Price>MSRP`

Defining a filter at the report table level

This section describes how to create a filter at the table level.

How to create a filter at the table level

1. Select and right-click the column in the report for which you want to filter data.

2. Choose Filter➛Filter. Filter appears, as shown in Figure 11-2.

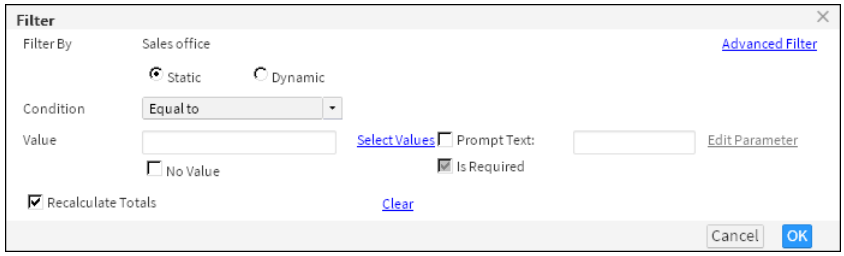


Figure 11-2 Filter displaying the selected column

Filter By displays the column on which to apply the filter.

3 Select Static as the type of filter, if necessary.

4 In Condition, select the comparison test, or operator, to apply to the selected column. Depending on the operator you select, Filter displays one or two Value fields, or a completed filter condition.

5 If you select an operator that requires a comparison value, you can specify the value in one of the following ways:

- In Value, type the value.
- To select from a list of values, choose Select Values. A list of values appears. Select a value from the list. Figure 11-3 shows the selection of Boston from the list of available sales office values.

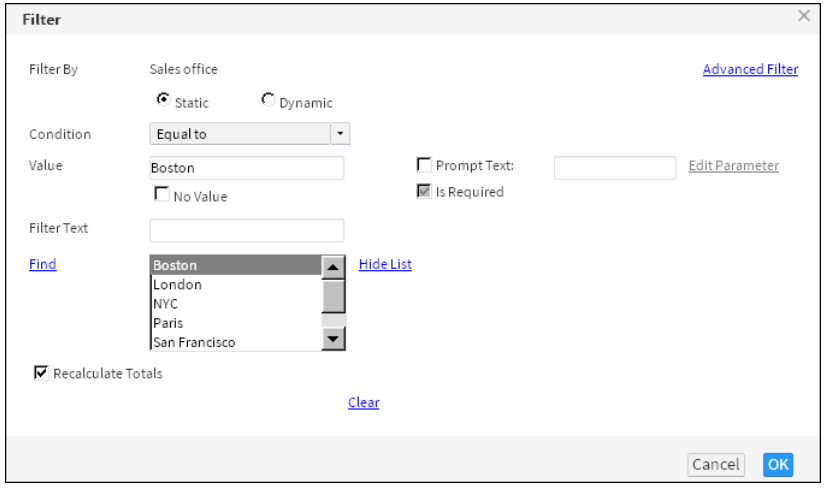


Figure 11-3 Specifying comparison values for a filter condition

- If the list of values is long, type a value in Filter Text and choose Find. If found, Report Studio displays this value in the list. When you select the value, it appears in Value.

- To specify null values, select No Value.
- If you are filtering a detail table containing aggregate data, or a summary table, you can recalculate the aggregate data values for the retrieved data rows by accepting the default selection of Recalculate Totals. To calculate totals for all the data rows in the report table, deselect Recalculate Totals.

6 Choose OK. The filter takes effect. In cases where the sample data in the BIRT design does not meet the filter condition, the BIRT design does not display any data. Report Studio displays the message in Figure 11-4. Always test a filter by running and viewing the generated BIRT design in Actuate Viewer.

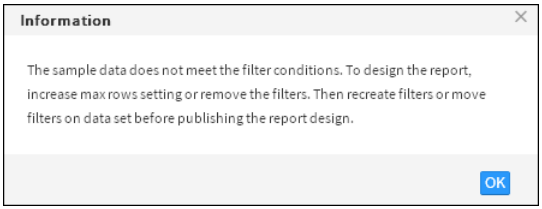


Figure 11-4 The message displayed when the sample data in the BIRT design does not meet the filter condition

Defining a filter at the data set level

When you create a new BIRT design Report Studio provides the Table Builder wizard to help you select data fields and create a data set filter. Once these data fields appear in the BIRT design, you can no longer invoke Table Builder. Instead, you use Advanced Filter to create or modify a data set level filter condition. When you select Filter➛Slicer Filter from the context menu of the report table handle, the filter condition you specify using Advanced Filter is evaluated at the data set level.

How to create a data set filter

1 In Report Studio, in Available Data, choose Filter.

2 Advanced Filter appears, as shown in Figure 11-5. To create a filter condition, complete the following steps:

   1 In Filter By, select a column from the drop-down list.

   2 In Condition, select an operator. Depending on the operator you choose, one or two value fields appear. The example in Figure 11-5 shows the selection of the operator Between, and two corresponding value fields.

   3 In Date From and Date To, do one of the following:

      - Type a value.
      - Choose Select Values, then select a value from the list of values that appears.

- Use the calendar tool to select a date.
- Select No Value to choose a Null value.

4 Choose Add Condition. Conditions displays the new condition, as shown in Figure 11-5.

5 Choose Validate to verify the syntax of the new condition.

6 Choose Add Filter. Filters displays the condition.

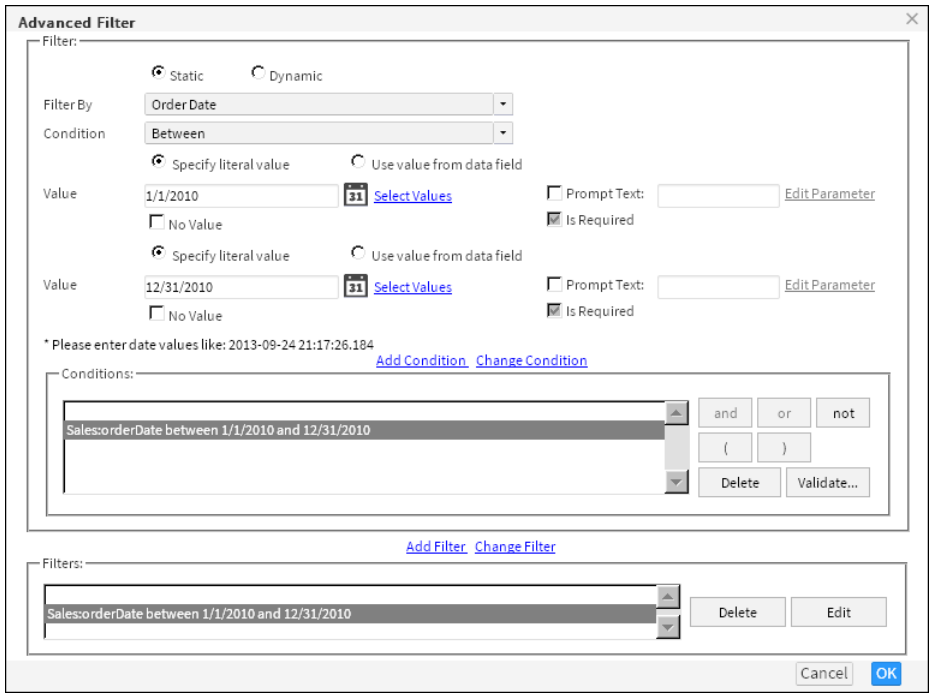


Figure 11-5 Specifying a data set filter in Table Builder

Choose OK. Report Studio displays data fields that meet the filter condition in the BIRT design.

How to modify a data set filter

To modify a data set filter condition, complete the following steps:

1 In Available Data, select Filter. Advanced Filter appears.

2 In the Filters area, select the condition, then choose Edit.

3 Modify the condition by changing the values in Filter By, Condition, or Value.

4 Select Change Condition. Then, select Change Filter.

Choose OK.

How to delete a data set filter condition

To delete a filter condition, in the Filters area of Advanced Filter, select a filter and select Delete. Then, select a condition and select Delete. Choose OK. Verify that any remaining filter conditions display the expected results.

Defining multiple filter conditions

You can add as many filters as you want, but each condition narrows the scope of data further, and adds complexity to the filter. Design and test filters with multiple conditions carefully. As you add filter conditions, Report Studio inserts the logical operator And between each filter expression. You can change this operator to Or. You can also add the Not operator to either the And or the Or operator to exclude a small set of data.

When you define more than two conditions, you can use parentheses to group conditions to get the results you expect. For example, A And B Or C is evaluated in that order, so A and B must be true or C must be true to include a data row. In A And (B Or C), B Or C is evaluated first, so A must be true and B Or C must be true to include a data row.

Use Advanced Filter to specify multiple filter conditions, as described in this section. Advanced Filter also displays all the filters for the report table. The procedure to modify and delete filter conditions in Advanced Filter is the same as when modifying and deleting data set level filter conditions in Advanced Filter, described earlier in this chapter.

When creating filter conditions for a summary table that uses a data model data source, the following conditions apply:

- You cannot use Advanced Filter to filter data in a measure column.
- You cannot use Advanced Filter to filter data in dimension and attribute columns if the summary table already contains a measure column with a defined filter condition.
- You can use Advanced Filter to create filters for dimension and attribute columns in a summary table using a data model data source, if no filter condition is defined on a measure column.

How to define multiple filter conditions

1. In Report Studio, select and right-click the column that contains the values to filter by, then choose Filter➛Filter.
2. In Filter, choose Advanced Filter.
3. In Advanced Filter, select Static, if necessary.

   Advanced Filter displays the selected column in Filter By. To use a different column, select a new column from the drop-down list.
4. Define a filter condition as follows:

1. In Condition, select a comparison operator.
2. Specify a value as you did earlier.
3. Choose Add Condition.

   The filter condition appears in the Conditions area.

5. Define the next filter condition on Advanced Filter as follows:
   1. In Filter By, select another column.
   2. Repeat step 4.

   In the Conditions area, the second filter condition appears after the first condition, as shown in Figure 11-6. By default, the second condition is preceded by the logical operator, And.

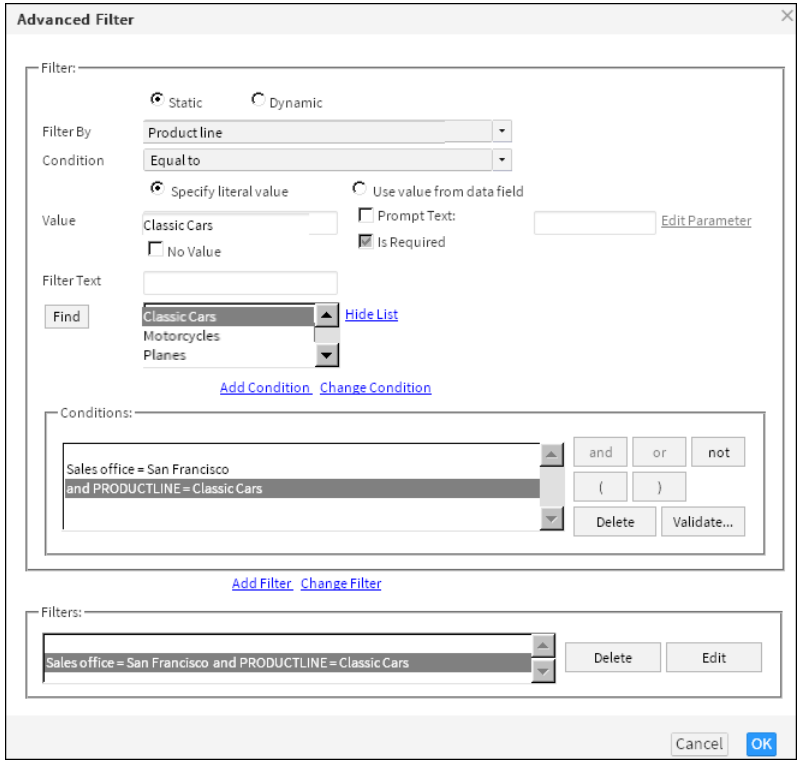


Figure 11-6 Advanced Filter displaying two conditions

6. Select a different logical operator, if necessary.
7. If the BIRT design contains aggregate data, do one of the following:
   - To recalculate aggregate data values across the filtered data rows, select Recalculate Totals, if necessary.

- To calculate aggregate data for the unfiltered data, deselect Recalculate Totals.

8. To add additional filter conditions, repeat step 4.
9. If you create more than two filter conditions and you use different logical operators, you can use the parentheses buttons to group conditions to determine the order in which conditions are evaluated.
10. Choose Validate to verify the syntax of the filter conditions, then choose Add Filter.

    The defined filter conditions appear in the Filters area, as shown in Figure 11-6. Choose OK.
11. Run the BIRT design to verify that it displays the expected results.

Prompting for filter values at run time

You can create a prompt that accepts a value or multiple values for a filter when a report is run. A prompt, also called a parameter, enables users reading the report to control the content of the report without editing the report. For example, in a report that displays sales data by sales office, instead of creating a filter that returns data for a specific office, you can create a prompt that asks the user to select the office for which they want to view data in the report.

Understanding parameters

In Report Studio, you can create a static or dynamic filter parameter at the data set level or at the report table level.

To construct a filter parameter, complete the following tasks:

- Choose a filter parameter type.
- Define a condition.
- Specify whether the parameter is required or optional.
- Specify a display type.
- Specify a list of values from which a user can select values. You can specify a static list or a dynamic list. You can create a dynamic list of values at the data set level or at the current column level.

Choosing a parameter type

A static filter parameter is a filter condition that the report developer defines, which prompts the user to specify one or more values when running a report. The filter condition typically consists of an operator, specified by the report developer,

and corresponding values to be specified by the report user when running a report.

A dynamic filter parameter differs from a static filter parameter in one important aspect: the report developer can provide report users with a list of operators to use to construct a filter condition. The user selects an operator, then specifies one or more corresponding values when running the report. The report displays data for the filter parameter condition the user constructs.

Making a filter parameter optional

When you create a prompt, you can require the user to specify a value, or you can make the value optional. If you make the value optional, the user can view the report with all the data. For example, if Parameters contains a list of sales offices for the user to choose from, if the prompt is not required, the user can leave the field blank to view sales data for all the sales offices.

You can require that the user supply a value if displaying all the data results in a very long report. A report that runs into hundreds of pages is not only difficult to read, but takes longer to generate. In Report Studio, a dynamic filter parameter is always optional.

How to make a prompt value optional

To make a prompt value optional, complete the following steps:

1. In Filter, select Prompt Text. Prompt Text and Is Required appear highlighted.
2. Deselect Is Required, as shown in Figure 11-7.

Figure 11-7 Specifying an optional prompt

Accepting multiple values

Users often want to select several values for a filter condition. In an inventory report, for example, the user might need to view data for several vendors. To support the selection of multiple values, create a filter parameter as follows:

- Select List Box as the display type.
- Select the In operator as one of the operators to provide to the user.
- Create a list of values.

Specifying a display type

When specifying properties for a static filter parameter, you can select the display types shown in Table 11-2 for the list of values. When specifying properties for a dynamic filter parameter, you can specify List Box or Text Box as the display type.

Table 11-2 Choosing a display type for the list of values

Option	Description	Use
Combo Box	Provides a combination of a drop-down list and a text box, where the user can either select a value from the list or type a value	Enables the user to select one or more values, or type a specific value for which Report Studio displays data.
List Box	Displays available values in a drop-down list	Enables users to select one or more values. If you use the In operator, the list box is the only available display type.
Radio Button	Displays the values as radio buttons	Enables the user to select one value at a time. Additionally, this option enables a report developer to provide the user with a limited number of values from which to choose.
Text Box	Requires that the user type a value	Enables the user to type a value for which Report Studio displays data.
Text Box-Auto Suggest	Provides the user with the available values that match a certain number of typed characters	Activate auto suggest after any number of typed characters. For example, if you activate auto suggest after one character, and if the user types S, all the values beginning with that character appear in a list from which the user selects a value. In case there is no match, Report Studio displays the message No Suggestions.

Providing the user with a list of values

To create a useful prompt, provide the user with a list of values from which to choose, since it is not always possible for the user to know what value to type. In some cases, providing a list of values, such as customer names or invoice numbers, is necessary.

You create a list of values using one of the following techniques:

- Create a static list of values.
  In a static list, the values you select to display to the report user are fixed in the BIRT design. You can either select from a list of values, or type values to populate the list of values. Create a static list if you want to control the list of

values displayed to the report user, for example, if you want to display only some of the values.

- Create a dynamic list of values.
  In a dynamic list, the software generates the list of values when the report runs, using the current values in the report table or the data set. You can create a dynamic list of values at the data set level, or at the report table level. Create a dynamic list for values that are frequently updated in the data source, such as new customer names or product names.

Creating a static filter parameter

This section describes how you can create a static filter parameter at the report table and data set level.

How to create a static filter parameter at the report table level

1 In Report Studio, select and right-click the column that contains the values for which you want to create a static prompt. Choose Filter➛Filter. Filter appears, as shown in Figure 11-8.

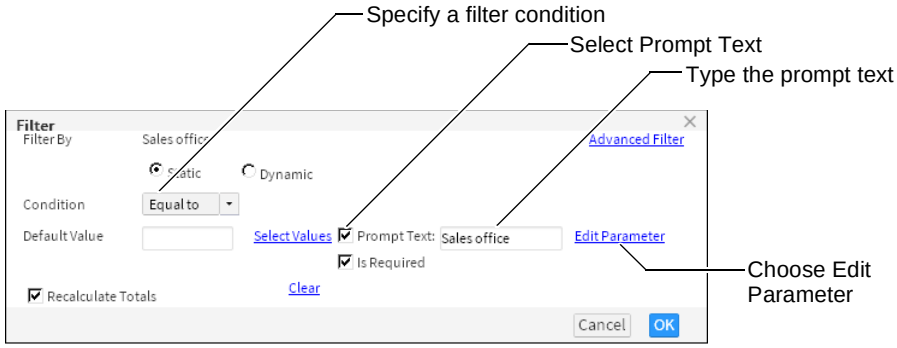


Figure 11-8 Creating a filter that prompts for a value when the report runs

2 In Filter, select Static, if necessary.

3 In Condition, select an operator.

4 Select Prompt Text, then type the text to display.

5 If the report contains aggregate data, do one of the following:

- To recalculate aggregate data values across the filtered data rows, select Recalculate Totals, if necessary.
- To calculate aggregate data for the unfiltered data, deselect Recalculate Totals.

6 Choose Edit Parameter, as shown in Figure 11-8.

7 Edit Parameter appears. In Edit Parameter, complete the following steps:

1. In Prompt Text, modify the existing text, if necessary.
2. In Help Text, optionally type a tooltip to assist the user in selecting the values for which Report Studio displays data.
3. Accept the default selection of Is Required. To make the parameter optional, deselect Is Required.
4. In Display Type, select an option from the list. The example in Figure 11-9 shows the display type set to Text Box.

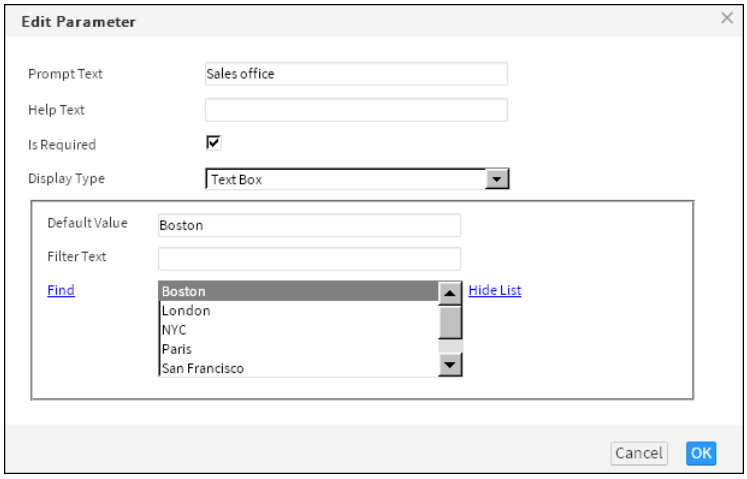


Figure 11-9 Creating a static parameter

5. Select the values to make available to the report user when the report runs. Choose Select Values. Select a value from the list of values that appears in Find, then press Ctrl and select each additional value to display.
6. If you selected Text Box as the display type, set a default value. If you do not specify a default value, the first value you selected is set as the default value. The example in Figure 11-9 displays Boston as the default value.

Choose OK. The specified default value appears in Default Value, on Filter, as shown in Figure 11-10. Choose OK. The filter condition takes effect.

How to create a static filter parameter with a list of values

When you create a static filter parameter and select an available display type other than Text Box, you can create a static or dynamic list of data values to provide to the user. To create a static filter parameter with a list of values, on Edit Parameter, complete the following steps:

1. In Prompt Text, if necessary, type the display text for the prompt.
2. In Help Text, optionally type a tooltip to assist the user in selecting values for which Report Studio displays data.

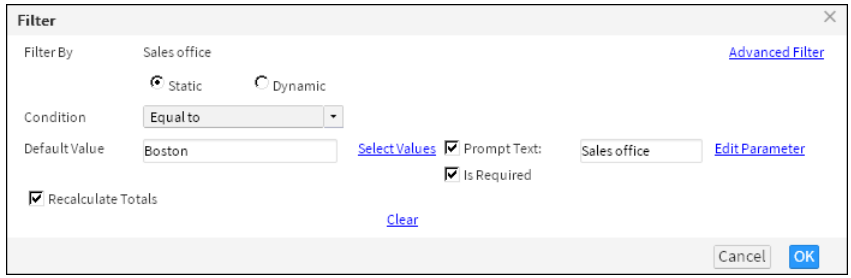


Figure 11-10 Filter displaying the specified parameter properties

3 Accept the default selection of Is Required. To make the parameter optional, deselect Is Required.

4 In Display Type, select an option other than Text Box from the list of options. The example in Figure 11-11 shows the selection of List Box.

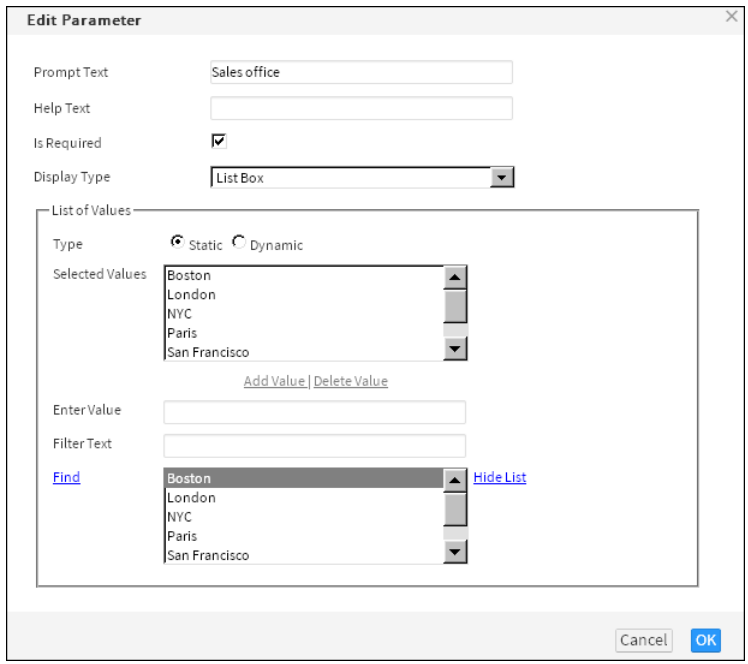


Figure 11-11 Creating a static list of parameter values

5 In List of Values, do one of the following:

- Select Static to create a static list of values that the report developer specifies. If you select Static, proceed to step 8.
- Select Dynamic to create a list of values that is retrieved from the data set when the report runs. If you select Dynamic, proceed to step 8.

6 To select the values to make available to the report user when the report runs, choose Select Values.

In Find, select a value from the list of values that appears, then press Ctrl and select any additional values to display. You can also type each value in Enter Value, then choose Add Value. The specified values appear in Selected Values.

7 In Selected Values, select a value to set as the default value, as shown in Figure 11-11.

- If the parameter is optional, you do not need to specify a default display value.
- If the parameter is optional, No Value appears on Edit Parameter. Select No Value to display data rows that have null values.

Choose OK. Proceed to step 10.

8 In Data Set, from the drop-down list, select Current column (No Data Set) to create the list of values from the report table, as shown in Figure 11-12, or select an available data set to create the list of values from the data set.

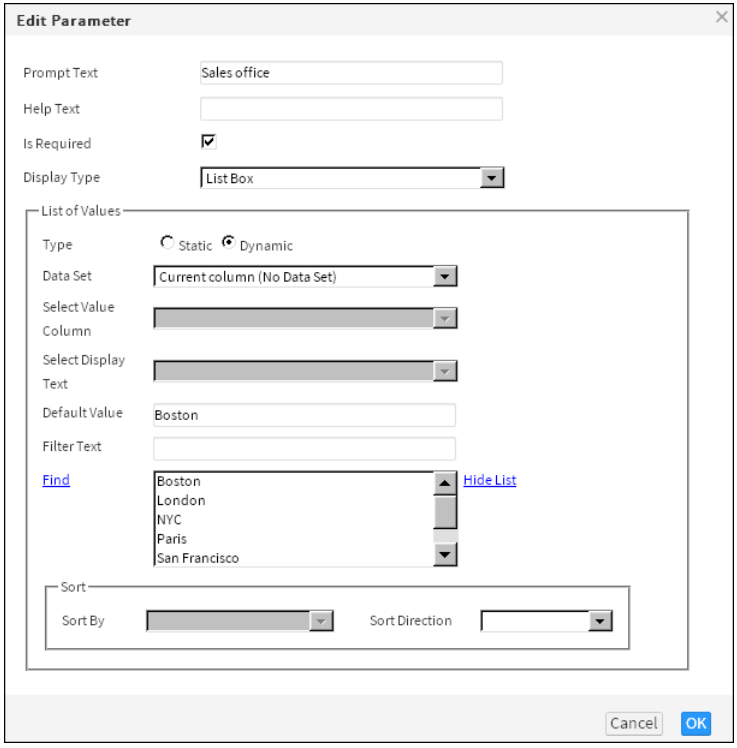


Figure 11-12 Creating a dynamic list of values

If you selected the current column, do the following:

- Choose Select Values. In Find, select a value from the list of values that appears, then press Ctrl and select each additional value to display. The first value you select is set as the default value.
- In Sort, in Sort Direction, optionally select either Ascending or Descending. If you do not specify a sort direction, Report Studio displays the default value first, and arranges the remaining values in ascending order below the default value.

Choose OK. Proceed to step 10.

9 In Data Set, if you selected an available data set, do the following:

- In Select Value Column, select the column whose values are filtered according to the parameter condition.
- In Select Display Text, select a column from the drop-down list, containing the values displayed to the user. For example, you can choose to display the office code values for the user to choose from, instead of the names of sales office cities.
- Choose Select Values. In Find, select a value from the list of values that appears, then press Ctrl and select the remaining values you want to display. The first value you select is set as the default value.
- In Sort, specify a field by which to sort the list of values.
- In Sort Direction, select either Ascending or Descending from the drop-down list. If you do not specify a sort direction, Report Studio displays the default value first, and arranges the remaining values in ascending order below the default value.

Choose OK.

10 On Filter, choose OK.

11 To test the prompt in Report Studio choose Data➛Parameters. Parameters displays the prompt, as shown in Figure 11-13. In this example, the default parameter value is Boston.

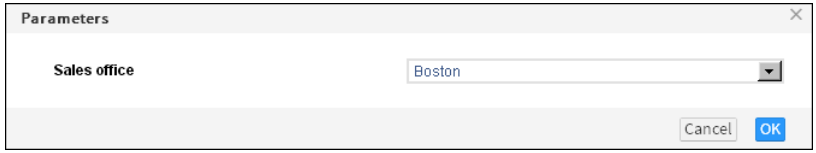


Figure 11-13 Parameters displaying the specified prompt

How to create a static filter parameter at the data set level

1 Create a new report by selecting a template containing a data set, an information object, or a data object.

2 Select the data fields to insert in the report, and lay out the report.

3 In Report Studio, in Available Data, choose Filter.

4 Advanced Filter appears. In Advanced Filter, in Filter By, select a column from the drop-down list.

5 In Condition, select an operator from the drop-down list.

6 Select Prompt Text, then type the text to display. Edit Parameter is highlighted, and Is Required appears selected.

7 Choose Edit Parameter. In Edit Parameter, create the parameter condition as you did earlier in this section.

Figure 11-14 displays the completed filter parameter condition. The selected default value appears in Default Value.

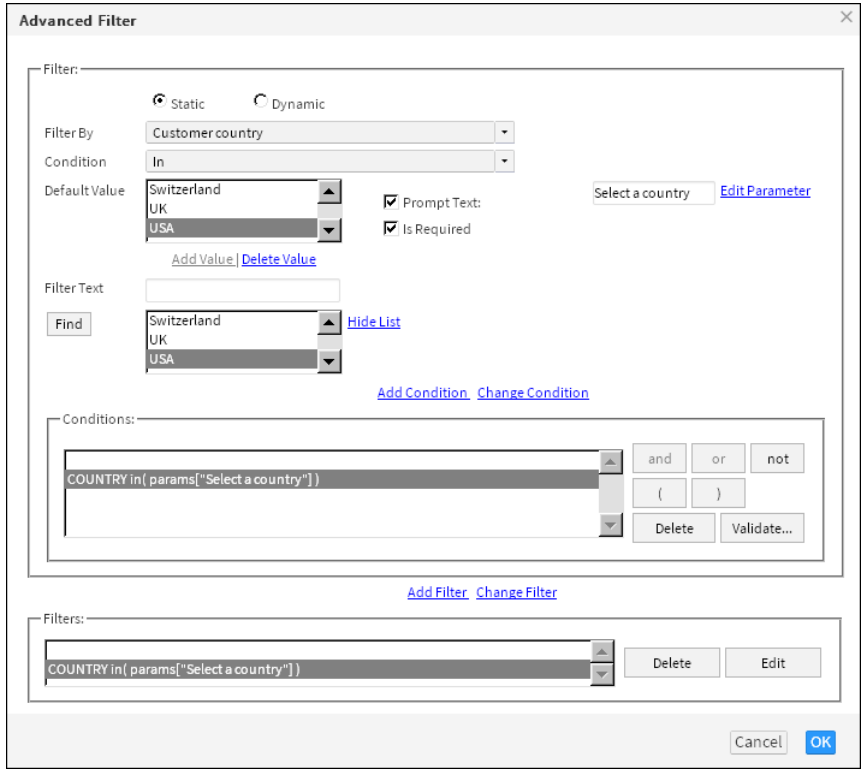


Figure 11-14 Advanced Filter displaying the static filter parameter condition

8 Choose Add Condition. The condition appears in Conditions, as shown in Figure 11-14.

9 Choose Add Filter. The static filter parameter condition appears in Filters.

Choose OK. The Filter pane displays the specified condition.

To test the prompt in Report Studio choose Data➛Parameters. Parameters displays the prompt, as shown in Figure 11-15. The default value specified in the example condition is USA.

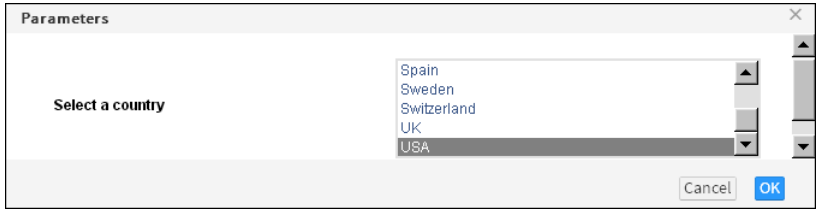


Figure 11-15 Parameters displaying that static parameter condition

Creating a dynamic filter parameter

Dynamic filter parameters provide users with more control over the data they view in a report. Figure 11-16 shows an example of the steps to create a dynamic filter parameter.

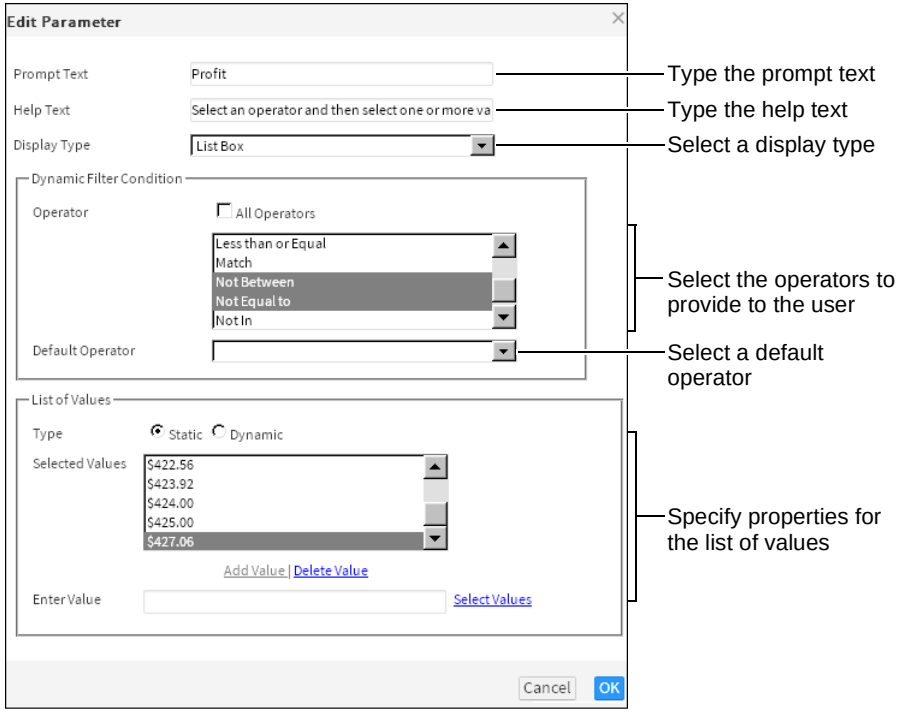


Figure 11-16 Specifying properties for a dynamic filter parameter

In Report Studio, dynamic filter parameters modify the underlying query, so only data rows that meet the filter criteria are retrieved from the data set.

The basic properties you specify when you create a dynamic filter parameter are similar to the properties for a static filter parameter, with one exception. On Edit Parameter, you specify the operators to provide to users, and set a default operator. Figure 11-16 shows an example of a dynamic filter parameter that includes a list of values. The display type is set to List Box. Dynamic filter parameters are always optional.

How to create a dynamic filter parameter at the report table level

1. Select and right-click the column for which you want to create a prompt. Choose Filter➛Filter. Filter appears. The selected column appears in Filter By.
2. Select Dynamic, as shown in Figure 11-17.
3. In Prompt Text, type a description for the prompt.
4. If the report contains aggregate data, do one of the following:
   - To recalculate aggregate data values across the filtered data rows, select Recalculate Totals, if necessary.
   - To calculate aggregate data for the unfiltered data, deselect Recalculate Totals.

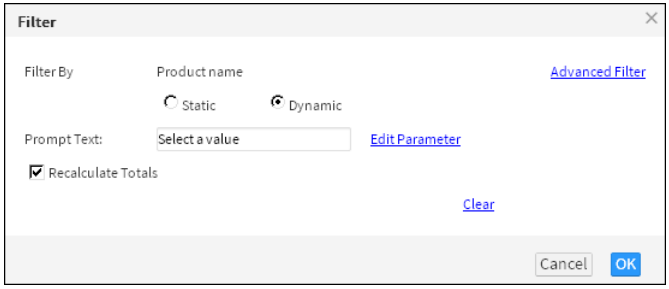


Figure 11-17 Specifying filter parameter properties

5. Choose Edit Parameter. In Edit Parameter, complete the following steps:
   1. In Prompt Text, if required, modify the text you typed earlier.
   2. In Help Text, optionally type a tooltip that assists the user in selecting parameter values, for which Report Studio displays data.
   3. In Display Type, choose List Box.
   4. In Dynamic Filter Condition, in Operator, select one or more operators from the drop-down list to provide to the user. By default, all operators are selected. To select operators from the list, deselect All Operators. Then, press Ctrl and select each operator from the list of available operators.

5 Select a default operator from the drop-down list.

6 In List of Values, do one of the following:

- Select Static to create a static list of values. Complete steps 8 and 9 in "How to create a static filter parameter with a list of values," earlier in this chapter.
- Select Dynamic to create a dynamic list of values. Complete steps 8 and 9 in "How to create a static filter parameter with a list of values," earlier in this chapter.

6 On Filter, choose OK.

7 To test the prompt in Report Studio, choose Data➛Parameters. Parameters displays the prompt, as shown in Figure 11-18.

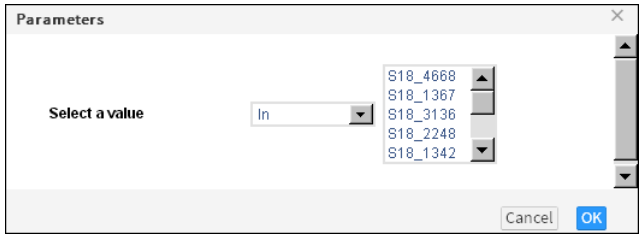


Figure 11-18 Parameters displaying a dynamic prompt

How to create a dynamic filter parameter at the data set level

1 In Report Studio, in Available Data, choose Filter.

Advanced Filter appears.

2 On Advanced Filter, select Dynamic, as shown in Figure 11-19.

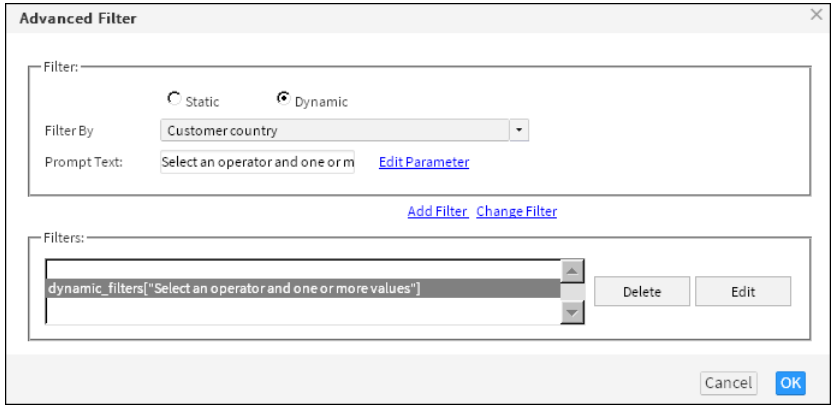


Figure 11-19 Advanced Filter displaying the dynamic filter parameter

3 In Filter By, select a column from the drop-down list.

4 Choose Edit Parameter. In Edit Parameter, create the parameter condition by completing step 5 in "How to create a dynamic filter parameter at the report table level," earlier in this chapter.

   In Advanced Filter, Prompt Text displays the text you entered earlier.

5 Choose Add Filter. The dynamic filter parameter condition appears in Filters, as shown in Figure 11-19.

   Choose OK. The Filter pane displays the condition.

6 To test the prompt in Report Studio, choose Data➛Parameters. Parameters displays the prompt, as shown in Figure 11-20. The default operator specified in the example condition is In, and the default value is USA.

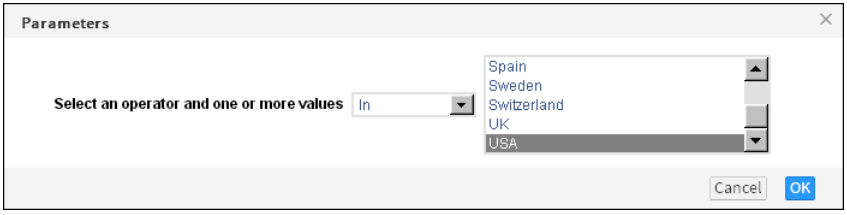


Figure 11-20 Parameters displaying the dynamic prompt

When working with a dynamic prompt for a column containing numeric data that uses the Match or Not Match operators, if you use the value 1 as the string value to match, you must use double quotation marks (" ") to enclose the value. Type the value as "1" in the text box or combo box, so that Report Studio evaluates it accurately as a literal string. If you use other numbers as strings, such as 2, 3, and so on, you do not need to enclose them in double quotation marks.

Creating multiple filter parameters

You can specify multiple static filter parameters, dynamic filter parameters, or a combination of both types. You create multiple filter parameters on Advanced Filter. The following section describes how to define multiple filter parameters in a BIRT design.

How to create multiple filter parameters

1 Select and right-click the first column for which you want to create a prompt. Choose Filter➛Filter. Filter appears. The selected column appears in Filter By.

2 Select Static or Dynamic.

- To create a static filter parameter, complete steps 1 to 9 in "How to create a static filter parameter with a list of values," earlier in this chapter.
- To create a dynamic filter parameter, complete steps 1 to 7 in "How to create a dynamic filter parameter at the report table level," earlier in this chapter.

3. On Filter, choose Advanced Filter.
4. On Advanced Filter, choose Add Condition. The filter parameter condition you previously specified appears in the Filters area in Advanced Filter.
5. Choose Add Filter.
6. To define the next condition, in Advanced Filter, complete the following steps:
    1. In Filter, select Static or Dynamic.
    2. In Filter By, select a column from the drop-down list.
    3. In Prompt Text, type the display text for the prompt.
    4. If the report contains aggregate data, do one of the following:
        - To recalculate aggregate data values across the filtered data rows, select Recalculate Totals, if necessary.
        - To calculate aggregate data for the unfiltered data, deselect Recalculate Totals.
    5. Choose Edit Parameter.
        - If you selected Static in step 1, complete steps 1 to 9 in "How to create a static filter parameter with a list of values," earlier in this chapter.
        - If you selected Dynamic in step 1, complete steps 1 to 7 in "How to create a dynamic filter parameter at the report table level," earlier in this chapter.
    6. In Advanced Filter, choose Add Filter.
7. To define additional filter parameters, in Advanced Filter, repeat step 6. Choose OK. The example in Figure 11-21 shows Advanced Filter displaying three filter parameter conditions.

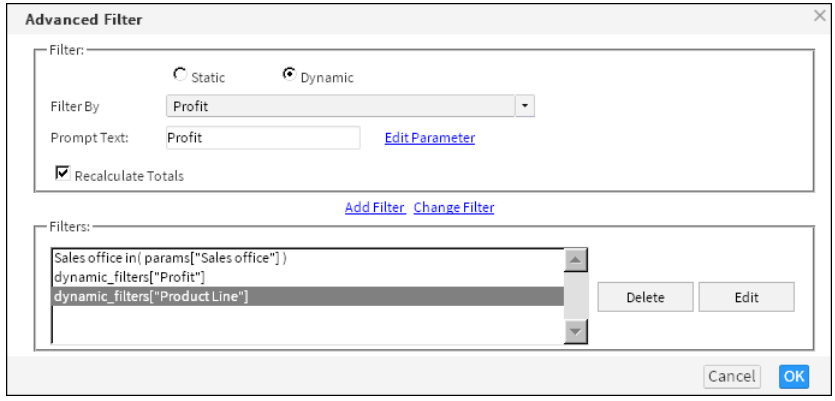


Figure 11-21 Defining multiple filter parameters in Advanced Filter

8 To test the prompt in Report Studio, choose Data➛Parameters. Parameters displays the prompt with the three defined conditions for which the user can supply values, as shown in Figure 11-22. The first condition is a static filter parameter, and the remaining two conditions are dynamic filter parameters.

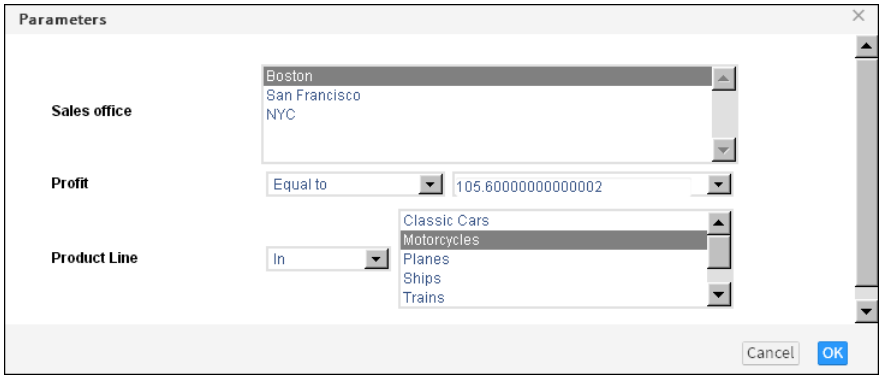


Figure 11-22 Specifying multiple filter parameter values

Chapter

12

Linking content

This chapter contains the following topics:

- About linking options
- Working with bookmarks
- Working with hyperlinks
- Working with default hyperlinks

About linking options

When creating a BIRT design, a BIRT developer can provide linking features to enable end users to navigate data more easily, and provide quick access to data in lengthy BIRT designs. In Report Studio, you can use the following linking options:

- Add bookmarks for users to access specific elements or sections in a BIRT design.
- Add hyperlinks for users to access data within the same BIRT design, other BIRT designs in the volume, and external web sites.

A bookmark defines a position in a BIRT design. A hyperlink provides the connection that helps the user navigate to the bookmarked content. You create bookmarks and hyperlinks using Report Studio and BIRT Designer Professional. Users can use these bookmarks and hyperlinks in Report Studio, the Viewers, Dashboards, and in exported output formats, such as PDF or HTML.

When a BIRT design uses a BIRT data object data source, the data object can contain data fields with links to additional information, such as subreports, charts, and so on. In Report Studio you can either enable or disable user access to these hyperlinks. The following sections describe how to create bookmarks and hyperlinks, and enable or disable default hyperlinks present in BIRT data objects.

Working with bookmarks

In Report Studio you can create bookmarks for a detail table, a summary table, a cross tab, and a chart at the table or section level.

To create a bookmark, you specify a name that is used by applications such as Report Studio, or Dashboards to identify the bookmarked element. You typically use hyperlinks with bookmarks, to link to content within the same report or in external reports stored in the volume.

Creating a bookmark

When naming a bookmark for use in all supported BIRT applications, make sure it meets the following guidelines:

- Begins with a letter ([A-Za-z]) and may be followed by any number of letters, digits ([0-9]), hyphens ("-"), underscores ("_"), colons (":"), and periods ("."). The letters in the name are case-sensitive.
- Is not enclosed in single or double quotation marks; does not include spaces or the percent symbol ("%").

- Is representative of the report element being bookmarked, such as CrossTab, SummaryTable, Chart, and so on.

How to define a bookmark for a report table

1. Select and right-click the target report element for which you want to define a bookmark, such as the report table, summary table, or cross tab element. Choose Bookmark.
2. Bookmark appears, as shown in Figure 12-1. In Enter Bookmark, type a name for the bookmark. Choose OK.

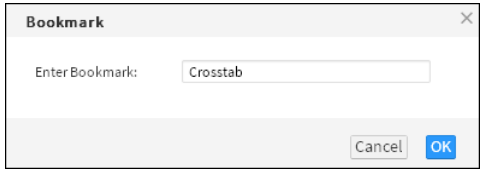


Figure 12-1 Creating a bookmark

How to define a bookmark for a report element in a section

1. Select and right-click the chart or other report element in the section. Choose Bookmark.
2. Bookmark appears, as shown in Figure 12-2. Select Generate Dynamic Bookmark Based on Section Value. Choose OK.

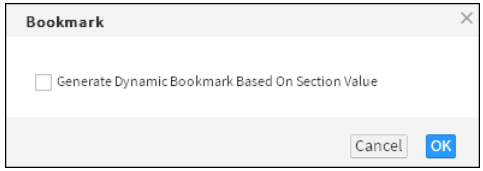


Figure 12-2 Creating a section-level bookmark

The report elements for which you define bookmarks in Report Studio can be displayed in Dashboards using a Reportlet gadget. A section-level bookmark can be accessed in a report document file by Dashboards.

Modifying a bookmark

To edit an existing bookmark, select and right-click the element containing the bookmark. Choose Bookmark. Then, for a table-level bookmark, in Bookmark, edit the name of the element in Enter Bookmark.

Deleting a bookmark

To delete an existing bookmark at the report table level, in Bookmark, delete the name of the element in Enter Bookmark. If you are working with a bookmark at

the report section level, deselect Generate Dynamic Bookmark Based on Section Value.

Working with hyperlinks

Using Report Studio, you can create hyperlinks in report columns, summary tables, or charts. These hyperlinks can be dynamically generated, based on EasyScript expressions that link to a data field. For example, if you select a hyperlink in a country column, and the target contains a filter parameter on the values in this column, using Hyperlink Builder, you can build an expression so that the user is prompted to supply a value for which the report displays data. When a hyperlink in the source report is selected, the target report prompts the user to provide a value for the data field containing parameters. Data-driven expressions are also supported when linking to an external URL. Like Excel, EasyScript provides functions for performing calculations on report data. In BIRT iHub, Report Studio does not support creating a dynamic data-driven expression for required parameters where no default value is supplied.

The example shown in Figure 12-3 displays a source report with a hyperlink in the country section. Figure 12-4 show parts of the target cross tab report. The hyperlink uses a bookmark defined in the target cross tab to identify the content to retrieve when a user activates the link in the source report.

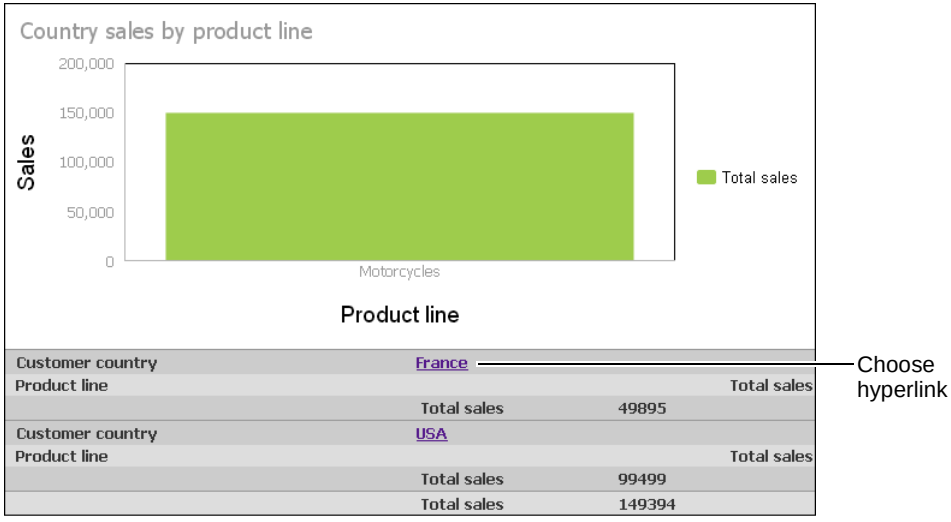


Figure 12-3 Choosing a hyperlink in the source report

Choosing the hyperlink in the source report launches the target cross tab report displaying sales details for all countries. Make sure the target report is stored in the iHub volume.

Figure 12-4 shows a portion of the cross tab displaying the quarterly sales and order quantity details by city and country for three years. When a user selects the hyperlink in the source report, Actuate Viewer displays the target cross tab report.

Breakdown of annual sales by quarter by geography

		2011		2012		2013		Grand Total	
		ORDERED	TotalSales	ORDERED	TotalSales	ORDERED	TotalSales	ORDERED	TotalSales
Australia	Chatswood	266	$24,013.52	803	$67,642.09	532	$42,251.51	**1601**	**$133,907.12**
	Glen Waverly	447	$35,505.63	94	$9,415.13	164	$10,945.26	**705**	**$55,866.02**
	Melbourne	591	$53,429.11	1335	$127,155.97			**1926**	**$180,585.08**
	North Sydney	874	$80,101.92			595	$56,932.30	**1469**	**$137,034.23**
	South Brisbane	336	$33,757.85			209	$21,432.31	**545**	**$55,190.16**
	Australia Total	**2514**	**$226,808.04**	**2232**	**$204,213.19**	**1500**	**$131,561.38**	**6246**	**$562,582.62**
Austria	Graz	430	$42,252.87			102	$8,807.12	**532**	**$51,059.99**
	Salzburg	442	$35,826.33	491	$49,233.67	509	$52,420.07	**1442**	**$137,480.07**
	Austria Total	**872**	**$78,079.20**	**491**	**$49,233.67**	**611**	**$61,227.19**	**1974**	**$188,540.06**
Belgium	Bruxelles			685	$62,253.85	111	$8,597.73	**796**	**$70,851.58**
	Charleroi	47	$2,755.76	114	$12,081.52	117	$14,379.90	**278**	**$29,217.18**
	Belgium Total	**47**	**$2,755.76**	**799**	**$74,335.37**	**228**	**$22,977.63**	**1074**	**$100,068.76**
Canada	Montréal	145	$16,909.84	287	$22,997.45	285	$29,070.38	**717**	**$68,977.67**
	Tsawassen			873	$66,812.01			**873**	**$66,812.01**
	Vancouver	355	$36,527.61	348	$33,594.58			**703**	**$70,122.19**
	Canada Total	**500**	**$53,437.45**	**1508**	**$123,404.04**	**285**	**$29,070.38**	**2293**	**$205,911.87**
Denmark	Kobenhavn	545	$53,959.21	596	$53,487.29	174	$21,638.62	**1315**	**$129,085.13**
	Århus	358	$36,164.46	524	$53,745.34			**882**	**$89,909.80**
	Denmark Total	**903**	**$90,123.67**	**1120**	**$107,232.63**	**174**	**$21,638.62**	**2197**	**$218,994.93**
Finland	Espoo	290	$29,716.86	233	$28,394.54	508	$45,785.34	**1031**	**$103,896.75**
	Helsinki	454	$37,602.48	382	$34,341.08	215	$23,602.90	**1051**	**$95,546.47**
	Oulu	342	$32,723.04	163	$16,212.59	605	$46,770.52	**1110**	**$95,706.15**
	Finland Total	**1086**	**$100,042.39**	**778**	**$78,948.21**	**1328**	**$116,158.76**	**3192**	**$295,149.36**

Figure 12-4 Viewing the target cross tab report

Creating a hyperlink

Using Hyperlink Builder in Report Studio, you can link two sections or elements in the same report, link a column or element to an external report, or link a column or element to an external web site. The following section describes how to create each type of hyperlink.

Linking two sections in a report

To link one report element to another element in the same report, use a bookmark and a hyperlink. First, define a bookmark for the target report element. Then, define a hyperlink in the source report element. Figure 12-5 shows an example that uses a bookmark and hyperlink to link two charts in the report.

Because the report is a multipage report, the section-level pie chart uses a hyperlink for users to easily navigate between the current page and the bar chart at the beginning of the report. The bar chart contains a bookmark, ReportTableChart, that the hyperlink uses.

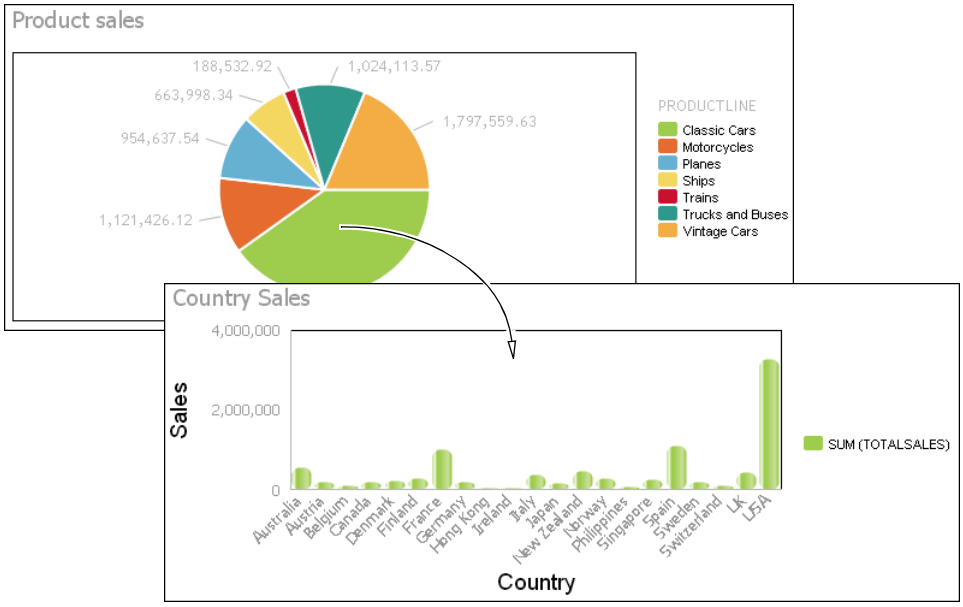


Figure 12-5 Viewing a hyperlink source and target report

How to create a hyperlink that links two sections in a report

1. Select and right-click the report column or report element for which you want to create a hyperlink. Choose Hyperlink.
2. Hyperlink Builder appears. In Hyperlink Builder, do the following:
   1. In Hyperlink Type, select Bookmark in this report.
   2. In Bookmark, choose EZ Script.
   3. In EZ Script, in Enter Expression, type:

      ```
      "ReportTableChart"
      ```

      Choose OK. Bookmark displays the bookmark you specified. Figure 12-6 uses the bookmark.
   4. In Tooltip, optionally type the text to display when the user hovers the mouse pointer over the hyperlink. Choose OK.

   The BIRT design displays the hyperlink based on the options you specified.

The example in Figure 12-5 displays the result of the hyperlink specified in Figure 12-6.

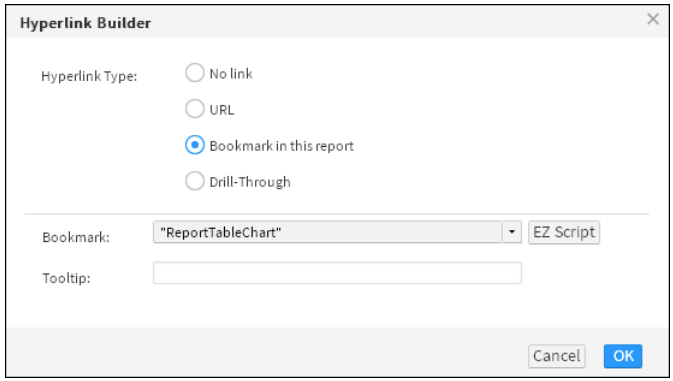


Figure 12-6 Creating a bookmark to link sections in the same report

Linking to a section in a different report

When you create a link from one report to a different report, or a section in a different report, first create a bookmark in the target report. Then create a hyperlink in the source report. This type of hyperlink is called a drill-through hyperlink. For drill-through hyperlink expressions, the EasyScript expression builder validates expressions using data fields that the target BIRT design and the source BIRT design share. If a data field does not appear in the list of available data fields in EZ Script, you must first add the data field to make it visible in this list.

When linking to an external report in the volume, you can create a hyperlink to a BIRT design, BIRT document, or to a file in any supported output format when exporting a report from the viewers. Supported formats include PDF, PostScript, HTML, Microsoft Word, Excel, PowerPoint, and so on.

How to create a drill-through hyperlink

The following procedure assumes that the target report already contains a bookmark.

1. Select and right-click the report column or report element for which you want to create a hyperlink. Choose Hyperlink.
2. Hyperlink Builder appears. On Hyperlink Builder, do the following:
    1. In Hyperlink Type, select Drill-Through.
    2. In Report, select Browse. Open File appears, as shown in Figure 12-7.

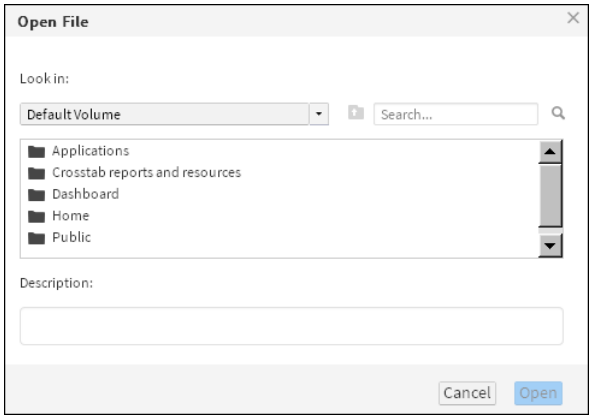


Figure 12-7 Navigating the folder structure to select a target report

3 In Open File, complete the following steps:

   1 Navigate the volume to the folder containing the target report.

   2 If you know the name of the file you want to specify, type the name, or relevant keywords in Search. Then, press Enter. Open File displays the reports that match the string you provided. Select the file from the list of files that appears.

   3 In Description, optionally type a description for the report.

   Choose OK.

4 In Hyperlink Builder, choose More. Hyperlink Builder displays additional options, as shown in Figure 12-8.

5 In Bookmark, use EZ Script to specify the bookmark in the target report to which to link. Bookmark displays the specified bookmark. If the target report does not contain a bookmark, the hyperlink points to the beginning of the target report, using the name of the report file.

6 In Target, do one of the following:

   - Select Current browser window or tab.
   - Select New browser window or tab.

7 In File Format, if necessary, select a format in which to display the target report.

8 In Tooltip, optionally type the text to display when the user hovers the mouse pointer over the hyperlink.

   Choose OK.

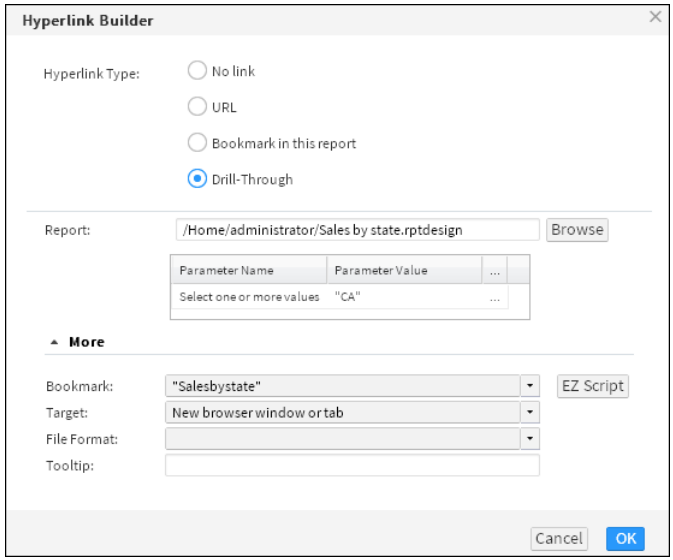


Figure 12-8 Creating a drill-through hyperlink to another report

The BIRT design creates the hyperlink based on the options you specified.

You can customize the data displayed in the target report and improve performance by using static filter parameters in the target report. Generating a filtered report is typically more efficient than generating a report that displays all the data. For example, Figure 12-9 shows a target report containing static filter parameters, for which you can specify a different state value.

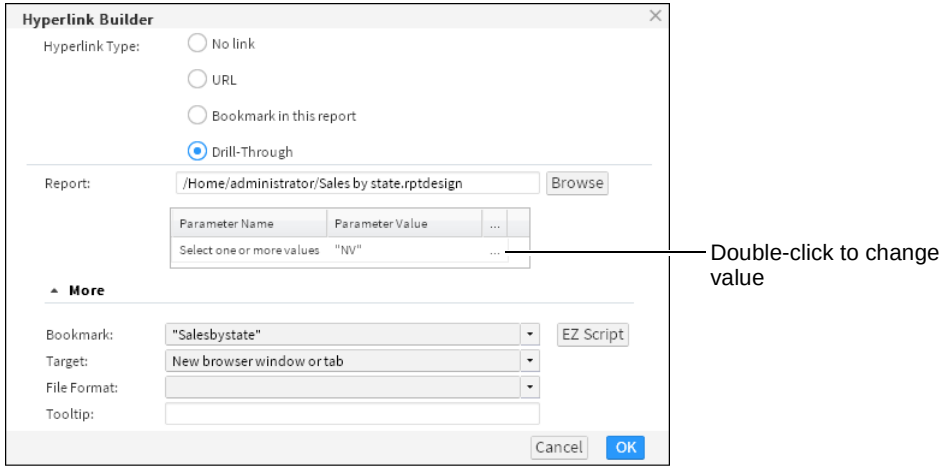


Figure 12-9 Modifying a parameter value

For the value specified in the example shown in Figure 12-9, Actuate Viewer displays sales details for Nevada, as shown in Figure 12-10.

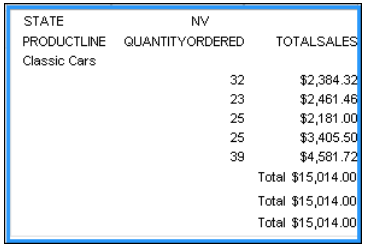


Figure 12-10 Viewing a target report based on a parameter value

Using Hyperlink Builder, you can also create a data-driven parameter value based on a data field in the report. Complete the following steps:

1. Double-click the value enclosed in double quotation marks (" "), as shown in Figure 12-9. EZ Script appears.
2. In EZ Script, in Enter Expression, type the left bracket ([), and select a data field from the list of fields that appears. Enclose the value in double quotation marks (" "). The example in Figure 12-11 shows the selection of the data field, State. If the data field you want to use does not appear in the list, select Add Data Field to add the data field to the list. Make sure you use shared data fields, present in the source and target report data sets.
3. Select Validate to make sure the syntax for parameter value expression is correct.
4. After a message appears confirming that the expression is valid, as shown in Figure 12-11, choose OK.

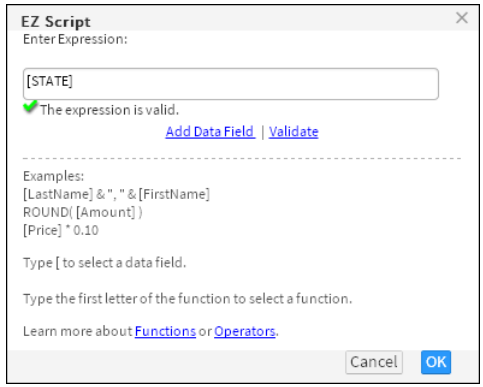


Figure 12-11 Expression syntax confirmation message

5. Hyperlink Builder displays the parameter expression you specified, as shown in Figure 12-12.

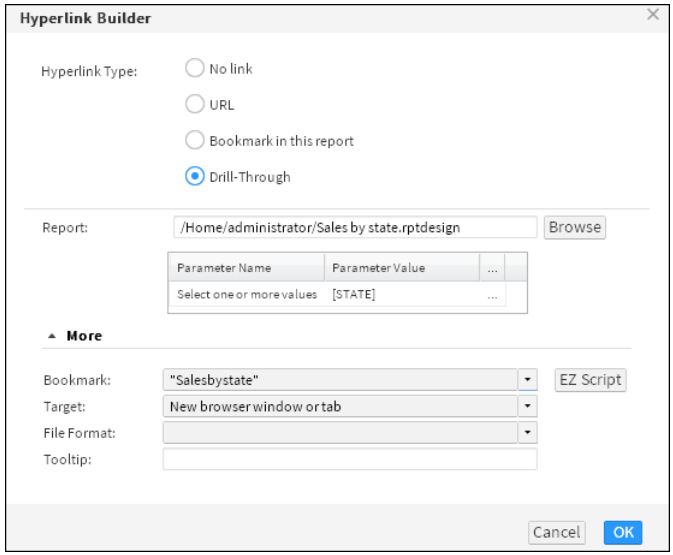


Figure 12-12 Displaying a parameter expression

6 Run the report to make sure the data displayed is what you expect.

When a user chooses the hyperlink, the target report uses the specified data field to prompt the user to supply a parameter value for which it retrieves data. In the target report, make sure that you set a default value for the static filter parameter, if the parameter is required. Report Studio does not require you to specify a default value for an optional static filter parameter.

Linking to a URL

You can also use hyperlinks to open an external document or web page by providing a uniform resource locator (URL). These links provide users with easy access to additional sources of information, creating more interactive reports.

For example, Figure 12-13 shows a report displaying weekly stock performance. To provide a user with additional information about the company, you can create a hyperlink so that choosing a value in the company name field launches the company web site. In the example shown in Figure 12-13, choosing MYCO directs a user to the web site, www.mycompany.com.

Company	Date	Open	Close	Low	High
MYCO	8/3/08	23.21	23.25	23.19	23.35
MYCO	8/4/08	23.24	23.3	23.19	23.31
MYCO	8/5/08	23.31	23.5	23.29	23.55
MYCO	8/6/08	23.55	23.52	23.48	23.56
MYCO	8/7/08	23.55	24	23.54	24.1

Figure 12-13 Displaying a hyperlink to an external URL

How to create a hyperlink to an external URL

1. Select and right-click the column for which you want to create a hyperlink. Choose Hyperlink.
2. Hyperlink Builder appears. In Hyperlink Builder, do the following:
    1. In Hyperlink Type, select URL.
    2. In Location, choose EZ Script, then do one of the following:
        - Type a single URL address that links all values of the data field. For example, type:

          `http://www.mycompany.com`

        - Construct an expression for each data row to link to a unique URL, as shown in Figure 12-14.

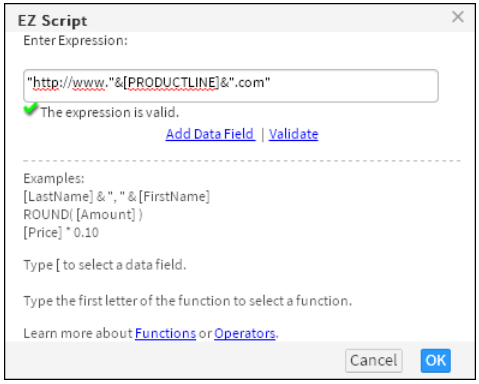


Figure 12-14 Linking each data row to a unique URL

    3. In Target, do one of the following:
        - Select Current browser window or tab.
        - Select New browser window or tab.

       If you select Current browser window or tab and launch the target report from Report Studio, the target report launches in a new browser window or tab, in order to preserve the data in the BIRT design. When you run the report in Actuate Viewer, selecting this option launches the target report in the current browser window or tab, as expected.
    4. In Tooltip, optionally type the text to display when the user hovers the mouse pointer over the hyperlink.

       Hyperlink Builder displays the options you specified, as shown in Figure 12-15. Choose OK.

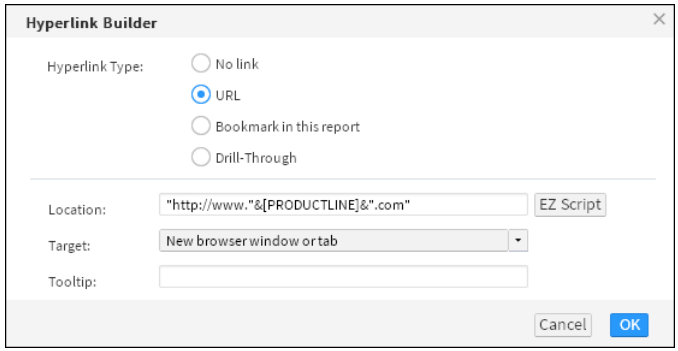


Figure 12-15 Linking to an external URL

Modifying a hyperlink

To modify a hyperlink, select and right-click the report element containing the hyperlink. Then, choose Hyperlink from the menu. In Hyperlink Builder, modify the type of hyperlink and other options as needed. Choose OK.

The report element displays the modified hyperlink.

Deleting a hyperlink

To delete a hyperlink, select the report element containing the hyperlink, then select Hyperlink from the context menu. On Hyperlink Builder, in Hyperlink Type, select No link. Choose OK.

The report element no longer displays the hyperlink.

Working with default hyperlinks

In Report Studio, when you create a new report using a data object that contains data fields with links to additional information, such as subreports or charts, a report developer can enable or disable user access to the linked data.

Hyperlinks that exist in a data object are enabled by default. When you select and insert data into the BIRT design, you can disable these hyperlinks using Table Builder or Hyperlink Builder. You can also use Hyperlink Builder to modify the properties of the existing hyperlinks.

How to enable default hyperlinks in a BIRT report using Table Builder

1 Create a new BIRT design and select a data object with hyperlinks. The data fields appear in Available Data, as shown in Figure 12-16.

2 In Table Builder—Data, if necessary, select Use Default Hyperlink, as shown in Figure 12-16.

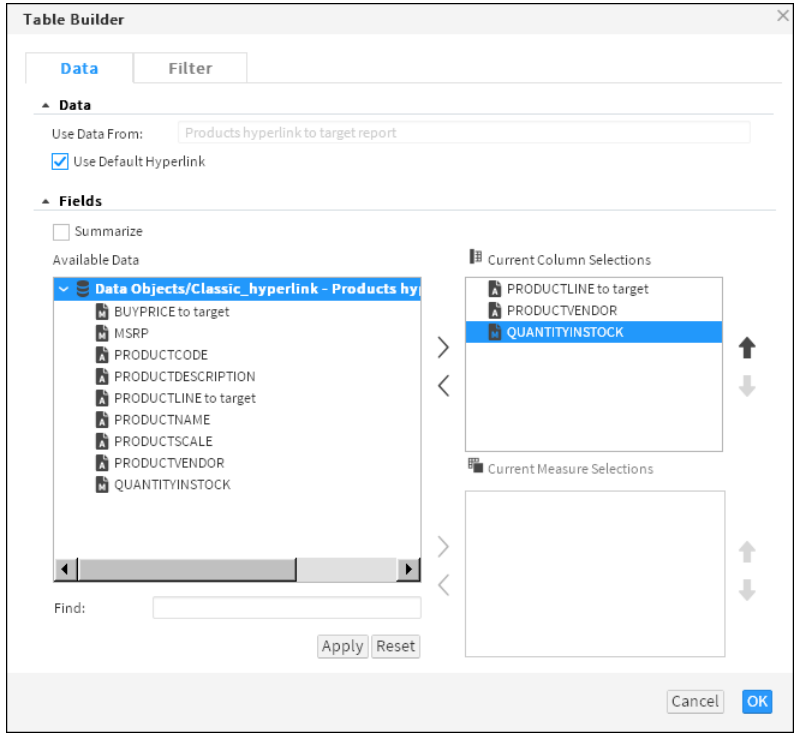


Figure 12-16 Accepting the option to display default hyperlinks

3 In Available Data, select one or more data fields containing hyperlinks, and choose the right arrow. The data fields appear in Current Column Selections.

Choose OK. Report Studio displays the BIRT design displaying any predefined hyperlinks, as shown in Figure 12-17. Choose each hyperlink to view the associated content.

PRODUCTLINE	PRODUCTVENDOR	QUANTITYINSTOCK
Motorcycles	Min Lin Diecast	7933
Classic Cars	Classic Metal Creations	7305
Motorcycles	Highway 66 Mini Classics	6625
Motorcycles	Red Start Diecast	5582
Classic Cars	Motor City Art Classics	3252
Classic Cars	Second Gear Diecast	6791
Classic Cars	Autoart Studio Design	68

Figure 12-17 BIRT design displaying default hyperlinks

How to disable default hyperlinks in a BIRT design using Hyperlink Builder

1. Create a new BIRT design using a data object design or data object store file.
2. Select a data set with data fields containing hyperlinks. Table Builder appears.
3. On Table Builder, choose Cancel. The data fields appear in Available Data.
4. Select the data fields to display in the BIRT design, then choose Insert. The data fields appear in the BIRT design, displaying existing hyperlinks.
5. Select a hyperlinked column, then choose Hyperlink from the context menu. Hyperlink Builder appears.
6. On Hyperlink Builder, in Hyperlink Type, select No link, as shown in Figure 12-18.

Figure 12-18 Disabling an existing hyperlink

Choose OK. The data fields appear in the BIRT design as regular data columns without displaying hyperlinks.

Part Five

Reference

Chapter

13

Functions and operators

This chapter contains the following topics:

- Functions
- Functions used in computed column expressions
- Functions used in aggregate calculations
- Operators

Functions

This section is a complete reference to all of the functions in Report Studio. This reference organizes the functions into two sections based on those used in expressions when creating a computed column and functions that are used to perform aggregate calculations.

Functions used in computed column expressions

The following list of functions appear when you create expressions to compute column data. Each function entry includes a general description of the function, its syntax, the arguments to the function, the result the function returns, and an example that shows typical usage. Use this reference to find information about a function that you want to use when you insert a computed column to display calculated data in a BIRT design.

ABS( )

Returns the absolute value of a number without regard to its sign. For example, 6 is the absolute value of 6 and -6.

Syntax ABS(num)

Argument **num**
The number or numeric expression that specifies the number for which you want to find the absolute value.

Returns A number that represents the absolute value of num.

Example The following example returns the absolute value for each number in the TemperatureCelsius data field:

```
ABS([TemperatureCelsius])
```

ADD_DAY( )

Adds a specified number of days to a date value.

Syntax ADD_DAY(date, daysToAdd)

Arguments **date**
The date or date expression that represents the start date.

daysToAdd
The number of days to add to the start date. If you specify a negative number, the result appears to subtract the number from the start date.

Returns The date value that results from adding the specified number of days to the start date.

Example The following example adds 15 days to each date value in the InvoiceDate data field:

```
ADD_DAY([InvoiceDate], 15)
```

ADD_HOUR( )

Adds a specified number of hours to a date value.

Syntax ADD_HOUR(date, hoursToAdd)

Arguments

date
The date or date expression that represents the start date. If a start date does not have a time value, the function assumes the time is midnight, 12:00 AM.

hoursToAdd
The number of hours to add to the start date. If you specify a negative number, the result appears to subtract the number from the start date.

Returns The date-and-time value that results from adding the specified number of hours to the start date.

Example The following example adds eight hours to each date value in the ShipDate data field:

```
ADD_HOUR([ShipDate], 8)
```

ADD_MINUTE( )

Adds a specified number of minutes to a date value.

Syntax ADD_MINUTE(date, minutesToAdd)

Arguments

date
The date or date expression that represents the start date. If a start date does not have a time value, the function assumes the time is midnight, 12:00 AM.

minutesToAdd
The number of minutes to add to the start date. If you specify a negative number, the result appears to subtract the number from the start date.

Returns The date-and-time value that results from adding the specified number of minutes to the start date.

Example The following example subtracts 30 minutes from each date in the StartTime data field:

```
ADD_MINUTE([StartTime], -30)
```

ADD_MONTH( )

Adds a specified number of months to a date value.

Syntax ADD_MONTH(date, monthsToAdd)

Arguments

date
The date or date expression that represents the start date.

monthsToAdd
The number of months to add to the start date. If you specify a negative number, the result appears to subtract the number from the start date.

Returns The date value that results from adding the specified number of months to the start date. This function always returns a valid date. If necessary, the day part of the resulting date is adjusted downward to the last day of the resulting month in the resulting year. For example, if you add one month to 1/31/08, ADD_MONTH( ) returns 2/29/08, not 2/31/08 or 2/28/08, because 2008 is a leap year.

Example The following example adds two months to each date value in the InitialRelease data field:

```
ADD_MONTH([InitialRelease], 2)
```

ADD_QUARTER( )

Adds a specified number of quarters to a date value.

Syntax ADD_QUARTER(date, quartersToAdd)

Arguments

date
The date or date expression that represents the start date.

quartersToAdd
The number of quarters to add to the start date. If you specify a negative number, the result appears to subtract the number from the start date.

Returns The date value that results from adding the specified number of quarters to the start date. A quarter is equal to three months. For example, if you add two quarters to 9/22/08, ADD_QUARTER( ) returns 3/22/09.

Example The following example adds two quarters to each date value in the ForecastClosing data field:

```
ADD_QUARTER([ForecastClosing], 2)
```

ADD_SECOND( )

Adds a specified number of seconds to a date value.

Syntax ADD_SECOND(date, secondsToAdd)

Arguments

date
The date or date expression that represents the start date. If a start date does not have a time value, the function assumes the time is midnight, 12:00 AM.

secondsToAdd
The number of seconds to add to the start date. If you specify a negative number, the result appears to subtract the number from the start date.

Returns The date-and-time value that results from adding the specified number of seconds to the start date.

Example The following example adds 30 seconds to each date value in the StartTime data field:

```
ADD_SECOND([StartTime], 30)
```

ADD_WEEK( )

Adds a specified number of weeks to a date value.

Syntax ADD_WEEK(date, weeksToAdd)

Arguments

date
The date or date expression that represents the start date.

weeksToAdd
The number of weeks to add to the start date. If you specify a negative number, the result appears to subtract the number from the start date.

Returns The date value that results from adding the number of weeks to the start date.

Example The following example adds two weeks to each date value in the OrderDate data field:

```
ADD_WEEK([OrderDate], 2)
```

ADD_YEAR( )

Adds a specified number of years to a date value.

Syntax ADD_YEAR(date, yearsToAdd)

Arguments

date
The date or date expression that represents the start date.

yearsToAdd
The number of years to add to the start date. If you specify a negative number, the result appears to subtract the number from the start date.

Returns The date value that results from adding the number of years to the start date.

Example The following example adds five years to each date value in the HireDate data field:

```
ADD_YEAR([HireDate], 5)
```

BETWEEN( )

Tests if a value is between two specified values.

Syntax BETWEEN(value, upperBound, lowerBound)

Arguments

value
The value to test. The value can be a string, numeric, or date value.

upperBound
The first value in the range of values to which to compare. String and date values must be enclosed in double quotation marks (" ").

lowerBound
The second value in the range of values to which to compare. String and date values must be enclosed in double quotation marks (" ").

Returns True if value is between upperBound and lowerBound, or equal to upperBound or lowerBound; returns false otherwise.

Examples The following example tests each value in the SalesTotal data field to see if the value is between 10000 and 20000:

```
BETWEEN([SalesTotal], 10000, 20000)
```

The following example tests each value in the CustomerName data field to see if the value is between A and M:

```
BETWEEN([CustomerName], "A", "M")
```

The following example tests each value in the ReceiptDate data field to see if the value is between 10/01/07 and 12/31/07:

```
BETWEEN([ReceiptDate], "10/01/07 12:00 AM", "12/31/07 12:00 AM")
```

The following example uses BETWEEN( ) in conjunction with the IF( ) and ADD_DAY( ) functions to calculate a shipment date. If an orderDate value is in December 2007 (between 12/1/07 and 12/31/07), add five days to the orderDate value. If an orderDate value is in a month other than December, add three days to the orderDate value.

```
IF((BETWEEN([orderDate], "12/1/07 12:00 AM", "12/31/07 12:00
   AM")), (ADD_DAY([orderDate], 5)), (ADD_DAY([orderDate], 3)))
```

CEILING( )

Rounds a number up to the nearest specified multiple.

Syntax CEILING(num, significance)

Arguments

num
The numeric value to round up.

significance
The multiple up to which to round num.

Returns The number that results from the rounding. If num is an exact multiple of significance, no rounding occurs.

Examples CEILING( ) is commonly used to round up prices. For example, to avoid dealing with pennies, if the Price value is 20.52, CEILING( ) returns 20.55. You can round prices in a Price data field up to the nearest nickel with the following expression:

```
CEILING([Price], 0.05)
```

If the Price value is 20.52, CEILING( ) returns 20.60. If the Price value is 20.40, CEILING( ) returns 20.40. No rounding occurs because 20.40 is already a multiple of 0.1. The following example rounds prices up to the nearest dime:

```
CEILING([Price], 0.1)
```

The following example rounds prices up to the nearest dollar. If the Price value is 20.30, CEILING( ) returns 21.0.

```
CEILING([Price], 1)
```

DAY( )

Returns a number from 1 to 31 that represents the day of the month.

Syntax DAY(date)

Argument **date**
The date or date expression from which you want to extract the day.

Returns The number of the day of the month for the specified date value.

Example The following example gets the number of the day for each date value in the ShipDate data field:

```
DAY([ShipDate])
```

DIFF_DAY( )

Calculates the number of days between two date values.

Syntax DIFF_DAY(date1, date2)

Arguments **date1**
The first date or date expression to use in the calculation.

date2
The second date or date expression to use in the calculation.

Returns The number of days between date1 and date2.

Example The following example calculates the number of days between each value in the invoiceDate data field and each value in the paymentDate data field:

```
DIFF_DAY([invoiceDate],[paymentDate])
```

The results show how long it takes to pay invoices.

The following example calculates the number of days from an order date to Christmas:

```
DIFF_DAY([orderDate], "12/25/08")
```

The following example calculates the number of days from the current date to Christmas. TODAY( ) is a function that returns the current date:

```
DIFF_DAY(TODAY(), "12/25/08")
```

DIFF_HOUR( )

Calculates the number of hours between two date values.

Syntax DIFF_HOUR(date1, date2)

Arguments **date1**
The first date or date expression to use in the calculation. If the date does not have a time value, the function assumes the time is midnight, 12:00 AM.

date2
The second date or date expression to use in the calculation. If the date does not have a time value, the function assumes the time is midnight, 12:00 AM.

Returns The number of hours between date1 and date2.

Example The following example calculates the number of hours between each value in the startTime data field and each value in the finishTime data field:

```
DIFF_HOUR([startTime],[finishTime])
```

The following example calculates the number of hours from the current date to Christmas. NOW( ) is a function that returns the current date and time. If you supply a literal date as an argument, you must include the time value, as shown in the following example:

```
DIFF_HOUR(NOW(), "12/25/08 12:00 AM")
```

DIFF_MINUTE( )

Calculates the number of minutes between two date values.

Syntax DIFF_MINUTE(date1, date2)

Arguments

date1
The first date or date expression to use in the calculation. If the date does not have a time value, the function assumes the time is midnight, 12:00 AM.

date2
The second date or date expression to use in the calculation. If the date does not have a time value, the function assumes the time is midnight, 12:00 AM.

Returns The number of minutes between date1 and date2.

Example The following example calculates the number of minutes between each value in the startTime data field and each value in the finishTime data field:

```
DIFF_MINUTE([startTime],[finishTime])
```

The following example calculates the number of minutes from the current date to Christmas. NOW( ) is a function that returns the current date and time. If you supply a literal date as an argument, you must include the time value, as shown in the following example:

```
DIFF_MINUTE(NOW(), "12/25/08 12:00 AM")
```

DIFF_MONTH( )

Calculates the number of months between two date values.

Syntax DIFF_MONTH(date1,date2)

Arguments

date1
The first date or date expression to use in the calculation.

date2
The second date or date expression to use in the calculation.

Returns The number of months between date1 and date2. The function calculates the difference by subtracting the month number of date1 from the month number of date2. For example, if date1 is 8/1/08 and date2 is 8/31/08, DIFF_MONTH( ) returns 0. If date1 is 8/25/08 and date2 is 9/5/08, DIFF_MONTH( ) returns 1.

Example The following example calculates the number of months between each value in the askByDate data field and each value in the ShipByDate data field:

```
DIFF_MONTH([askByDate],[shipByDate])
```

The following example calculates the number of months from each value in the hireDate data field to the end of the year:

```
DIFF_MONTH([hireDate], "1/1/09")
```

DIFF_QUARTER( )

Calculates the number of quarters between two date values.

Syntax DIFF_QUARTER(date1, date2)

Arguments

date1
The first date or date expression to use in the calculation.

date2
The second date or date expression to use in the calculation.

Returns The number of quarters between date1 and date2. DIFF_QUARTER calculates the difference by subtracting the month number of date1 from the month number of date2. A difference of three months is equal to one quarter. For example, if date1 is 8/1/08 and date2 is 10/31/08, DIFF_QUARTER( ) returns 0. If date1 is 8/25/08 and date2 is 11/5/08, DIFF_QUARTER( ) returns 1.

Example The following example calculates the number of quarters between each value in the PlanClosing data field and each value in the ActualClosing data field:

```
DIFF_QUARTER([PlanClosing],[ActualClosing])
```

The following example calculates the number of quarters from each value in the orderDate data field to the end of the year:

```
DIFF_QUARTER([orderDate], "1/1/09")
```

DIFF_SECOND( )

Calculates the number of seconds between two date values.

Syntax DIFF_SECOND(date1, date2)

Arguments

date1
The first date or date expression to use in the calculation. If the date does not have a time value, the function assumes the time is midnight, 12:00 AM.

date2
The second date or date expression to use in the calculation. If the date does not have a time value, the function assumes the time is midnight, 12:00 AM.

Returns The number of seconds between date1 and date2.

Example The following example calculates the number of seconds between each value in the startTime data field and each value in the finishTime data field:

```
DIFF_SECOND([startTime],[finishTime])
```

The following example calculates the number of seconds from the current date to Christmas. NOW( ) is a function that returns the current date and time. If you supply a literal date as an argument, you must include the time value, as shown in the following example:

```
DIFF_SECOND(NOW(), "12/24/08 12:00 AM")
```

DIFF_WEEK( )

Calculates the number of weeks between two date values.

Syntax DIFF_WEEK(date1, date2)

Arguments

date1
The first date or date expression to use in the calculation.

date2
The second date or date expression to use in the calculation.

Returns The number of weeks between date1 and date2. The function calculates the difference by subtracting the week number of date1 from the week number of date2. For example, if date1 is 1/3/08 (week 1 of the year), and date2 is 1/7/08 (week 2 of the year), DIFF_WEEK( ) returns 1.

Example The following example calculates the number of weeks between each value in the askByDate data field and each value in the shipByDate data field:

```
DIFF_WEEK([askByDate],[shipByDate])
```

The following example calculates the number of weeks from each value in the orderDate data field to the end of the year:

```
DIFF_WEEK([orderDate], "1/1/09")
```

DIFF_YEAR( )

Calculates the number of years between two date values.

Syntax DIFF_YEAR(date1, date2)

Arguments

date1
The first date or date expression to use in the calculation.

date2
The second date or date expression to use in the calculation.

Returns The number of years between date1 and date2. The function calculates the difference by subtracting the year number of date1 from the year number of date2. For example, if date1 is 1/1/08 and date2 is 12/31/08, DIFF_YEAR( ) returns 0. If date1 is 11/25/08 and date2 is 1/5/09, DIFF_YEAR( ) returns 1.

Example The following example calculates the number of years between each value in the HireDate data field and each value in the TerminationDate data field:

```
DIFF_YEAR([HireDate],[TerminationDate])
```

The following example calculates the number of years from each value in the HireDate data field to the current date. TODAY( ) is a function that returns the current date:

```
DIFF_YEAR([HireDate], TODAY())
```

FIND( )

Finds the location of a substring in a string.

Syntax FIND(strToFind, str)

FIND(strToFind, str, startPosition)

Arguments

strToFind
The substring to search for. The search is case-sensitive.

str
The string in which to search.

startPosition
The position in str where the search starts.

Returns The numerical position of the substring in the string. The first character of a string starts at 1. If the substring is not found, FIND( ) returns 0.

Example The following example searches for the substring, Ford, in each ProductName value:

```
FIND("Ford", [ProductName])
```

If the product name is 1969 Ford Falcon, FIND( ) returns 6.

The following example searches for the first hyphen (-) in each product code:

```
FIND("-", [ProductCode])
```

If the product code is ModelA-1234-567, FIND( ) returns 7.

The following example uses FIND( ) in conjunction with the LEFT( ) function to display the characters that precede the hyphen in a product code. The LEFT( ) function extracts a substring of a specified length, starting from the first character. In this example, the length of the substring to display is equal to the numerical position of the hyphen character.

```
LEFT([ProductCode], FIND("-", [ProductCode]))
```

If the product code is ModelA-1234, LEFT( ) returns the following string:

```
ModelA
```

IF( )

Returns one value if a specified condition evaluates to TRUE, or another value if the condition evaluates to FALSE.

Syntax IF(condition, doIfTrue, doIfFalse)

Arguments

condition
The condition to test.

doIfTrue
The value to return if condition evaluates to TRUE.

doIfFalse
The value to return if condition evaluates to FALSE.

Returns Returns the doIfTrue value if condition is true or the doIfFalse value if condition is false.

Example The following example calculates and displays different discount amounts based on the value in the Total data field. If the Total value is greater than 5000, the discount is 15%; otherwise, the discount is 10%.

```
IF([Total]>5000, [Total]*15%, [Total]*10%)
```

The following example uses IF( ) in conjunction with the BETWEEN( ) and ADD_DAY( ) functions to calculate a shipment date. If an orderDate value is in December 2007 (between 12/1/07 and 12/31/07), add five days to the orderDate value. If an orderDate value is in a month other than December, add three days to the orderDate value.

```
IF((BETWEEN([orderDate], "12/1/07 12:00 AM", "12/31/07 12:00
   AM")), (ADD_DAY([orderDate], 5)), (ADD_DAY([orderDate], 3)))
```

The following example checks each value in the Office data field. If the value is Boston, San Francisco, or NYC, the computed column displays U.S. If the value is something other than Boston, San Francisco, or NYC, the computed column displays Europe and Asia Pacific.

```
IF([Office]="Boston" OR [Office]="San Francisco" OR
   [Office]="NYC", "U.S.", "Europe and Asia Pacific")
```

IN( )

Tests if a value is equal to a value in a list.

Syntax IN(value, check1,..., checkN)

Arguments

value
The value to test. The value can be a string, numeric, or date value.

check1, ..., checkN
The value or values to which to compare.

Returns True if value is equal to one of the check values; returns false otherwise.

Example The following example tests if New Haven, Baltimore, or Cooperstown are values in the city data field. If any one of the cities is in the data field, IN( ) returns true.

```
IN([city], "New Haven", "Baltimore", "Cooperstown")
```

The following example tests if 9/15/08 or 9/30/08 are values in the payDate data field. If you supply a literal date as an argument, you must include the time value, as shown in the following example:

```
IN([payDate], "9/15/08 12:00 AM", "9/30/08 12:00 AM")
```

The following example uses IN( ) in conjunction with the IF( ) function to test if Ships or Trains are values in the ProductLine data field. If Ships or Trains is a value in the field, the computed column displays Discontinued Item; otherwise, the product line value is displayed as it appears in the field.

```
IF(IN([ProductLine], "Ships", "Trains"),"Discontinued Item",
   [ProductLine])
```

ISNULL( )

Tests if a value in a specified data field is a null value. A null value means that no value exists.

Syntax ISNULL(value)

Argument **value**
The data field in which to check for null values.

Returns True if a value in the specified data field is a null value; returns false otherwise.

Example The following example uses ISNULL( ) in conjunction with the IF( ) function to test for null values in the BirthDate data field. If there is a null value, the computed column displays No date specified; otherwise the BirthDate value is displayed.

```
IF(ISNULL([BirthDate]), "No date specified", [BirthDate])
```

LEFT( )

Extracts a substring from a string, starting from the leftmost, or first, character.

Syntax LEFT(str)

LEFT(str, n)

Arguments **str**
The string from which to extract a substring.

n
The number of characters to extract, starting from the first character.

Returns A substring of a specific length:

- If you omit n, the number of characters to extract, the function returns the first character only.
- If n is zero, the function returns an empty string.
- If n is greater than the length of the string, the function returns the entire string.

Example The following example displays the first letter of each name in the CustomerName data field:

```
LEFT([CustomerName])
```

The following example uses the LEFT( ) and FIND( ) functions to display the characters that precede the hyphen in a product code:

```
LEFT([ProductCode], FIND("-", [ProductCode]))
```

If the product code is ModelA-1234, LEFT( ) returns the following string:

```
ModelA
```

LEN( )

Counts the number of characters in a string.

Syntax LEN(str)

Argument **str**
The string expression to evaluate.

Returns The number of characters in the specified string.

Example The following example returns the length of each value in the ProductCode data field:

```
LEN([ProductCode])
```

The following example uses LEN( ) in conjunction with the RIGHT( ) and FIND( ) functions to display the characters that appear after the hyphen in a product code. RIGHT( ) extracts a substring of a specified length, starting from the last character. In this example, the length of the entire string returned by LEN( ) minus the length up to the hyphen is the number of characters to display.

```
RIGHT( [PRODUCTNAME], LEN([PRODUCTNAME] ) - (FIND("-" ,
   [PRODUCTNAME] )))
```

If the product code is ModelA-Ford, RIGHT( ) returns the following string:

```
A-Ford
```

LIKE( )

Tests if a string matches a pattern.

Syntax LIKE(str, pattern)

str
The string to evaluate.

pattern
The string pattern to match. You must enclose the pattern in double quotation marks (" "). The match is case-sensitive. You can use the following special characters in a pattern:

- A percent character (%) matches zero or more characters. For example, %ace% matches any string value that contains the substring ace, such as Facebook,

and MySpace. It does not match Ace Corporation because this string contains a capital A, and not the lowercase a.

- An underscore character (_) matches exactly one character. For example, t_n matches tan, ten, tin, and ton. It does not match teen or tn.

To match a literal percent (%) or underscore (_), precede those characters with two backslash (\\) characters. For example, to see if a string contains M_10, specify the following pattern:

```
"%M\\_10%"
```

Returns True if the string matches the pattern; returns false otherwise.

Example The following example returns true for values in the customerName field that start with D:

```
LIKE([customerName], "D%")
```

The following example returns true for productCode values that contain the substring Ford:

```
LIKE([productCode], "%Ford%")
```

The following example uses two LIKE( ) expressions to look for the substrings "Ford" or "Chevy" in each ProductName value. If a product name contains either substring, the computed column displays U.S. Model; otherwise, it displays Imported Model.

```
IF(((LIKE([ProductName], "%Ford%") = TRUE) OR (LIKE([ProductName],
   "%Chevy%") = TRUE)), "U.S. Model", "Imported Model")
```

LOWER( )

Converts all letters in a string to lowercase.

Syntax LOWER(str)

Argument **str**
The string to convert to lowercase.

Returns The specified string in all lowercase letters.

Example The following example displays all the string values in the productLine data field in lowercase:

```
LOWER([productLine])
```

MATCH( )

Returns a Boolean indicating whether a pattern exists within a string.

Syntax MATCH(source, pattern)

Arguments

source
The string to evaluate.

pattern
The string pattern to match. The pattern uses ECMAScript (JavaScript) syntax, as defined in Section 15.10 of Standard ECMA-262.

Returns True if the pattern matches; false otherwise.

Example The following example uses ECMAScript syntax in the pattern to detect any set of characters followed by the letter C, and returns true:

```
MATCH("ABC",".*C")
```

The following example checks whether the string starts with the letter X, followed by any single character, and ending with C. It returns false:

```
MATCH("ABC","X.C")
```

MOD( )

Returns the modulo value for a number and a divisor.

Syntax MOD(number, divisor)

Arguments

number
The number from which to derive the mod value.

divisor
The divisor for the mod function.

Returns Returns the remainder value of number divided by divisor.

Example The following example computes the remainder of the PriceEstimate data field divided by 12, returning an integer. For example, if the PriceEstimate value is 27365, MOD( ) returns 5.

```
MOD([PriceEstimate], 12)
```

MONTH( )

Returns the month for a specified date value.

Syntax MONTH(date)

MONTH(date, option)

Arguments

date
The date or date expression whose month to get.

option
A number that represents the month format to return. Use one of the following values:

- 1 to get the month as a number from 1 to 12.
- 2 to get the full month name, for example, January. The result is locale-specific.
- 3 to get the abbreviated month name, for example, Jan. The result is locale-specific.

If you omit option, MONTH( ) returns the month as a number.

Returns The month for a specified date value.

Example The following example returns the month (1–12) for each value in the ShipDate data field:

```
MONTH([ShipDate])
```

The following example returns the full month name for each ShipDate value:

```
MONTH([ShipDate], 2)
```

NOT( )

Negates a Boolean expression.

Syntax NOT(expression)

Argument **expression**
The Boolean value or expression to negate.

Returns True if the expression evaluates to FALSE; false if the expression evaluates to TRUE.

Example The following example uses NOT( ) in conjunction with the IF( ) and LIKE( ) functions. It tests if the value in the State data field is not CA. If the value is not CA, it returns the value of the Markup data field multiplied by 10%. If the value is CA, it returns the value of the Markup data field multiplied by 15%:

```
IF(NOT(LIKE([State], "CA")),[Markup]*10%,[Markup]*15%)
```

The previous IF( ) statement is semantically equivalent to the following statement:

```
IF(LIKE([State], "CA"),[Markup]*15%,[Markup]*10%)
```

NOTNULL( )

Tests if a value in a specified data field is a non-null value.

Syntax NOTNULL(value)

Argument **value**
The data field in which to check for non-null values.

Returns True if a value in the specified data field is not a null value; returns false otherwise.

Example The following example uses NOTNULL( ) in conjunction with the IF( ) function to test for non-null values in the BirthDate data field. If there is a non-null value, the BirthDate value is displayed; otherwise the string "No date specified" is displayed.

```
IF(NOTNULL([BirthDate]), [BirthDate], "No date specified")
```

NOW( )

Returns the current date and time.

Syntax NOW( )

Returns The current date and time. For example:

```
Sep 23, 2008 11:56 AM
```

Example The following example uses the DIFF_MINUTE( ) and NOW( ) functions to calculate the number of minutes from the current date and time to Christmas:

```
DIFF_MINUTE(NOW(), "12/25/08 12:00 AM")
```

QUARTER( )

Returns the quarter number for a specified date value.

Syntax QUARTER(date)

Arguments **date**
The date or date expression whose quarter number to get.

Returns A number from 1 to 4 that represents the quarter for a specified date value. Quarter 1 starts in January.

Example The following example displays the quarter number for each value in the CloseDate data field:

```
QUARTER([CloseDate])
```

The following example displays a string—Q1, Q2, Q3, or Q4—for each value in the CloseDate data field:

```
"Q" & QUARTER([CloseDate])
```

RIGHT( )

Extracts a substring from a string, starting from the rightmost, or last, character.

Syntax RIGHT(str)

RIGHT(str, n)

Arguments **str**
The string from which to extract a substring.

n
The number of characters to extract, starting from the last character.

Returns A substring of a specific length.

- If you omit n, the number of characters to extract, the function returns the last character only.
- If n is zero, the function returns an empty string.
- If n is greater than the length of the string, the function returns the entire string.

Example The following example displays the last four characters of each value in the ProductCode data field:

```
RIGHT([ProductCode], 4)
```

The following example uses RIGHT( ) in conjunction with the LEN( ) and FIND( ) functions to display the characters that appear after the hyphen in a product code. This example assumes that the number of characters after the hyphen varies. Therefore, the length of the entire string (returned by LEN( )) minus the length up to the hyphen (returned by FIND( )) is the number of characters to display.

```
RIGHT([ProductCode], (LEN([ProductCode]) - FIND("-" ,
   [ProductCode])))
```

If the product code is ModelA-Ford, RIGHT( ) returns Ford. If the product code is ModelB-Toyota, RIGHT( ) returns Toyota.

ROUND( )

Rounds a number to a specified number of digits.

Syntax ROUND(num)

ROUND(num, dec)

Arguments **num**
The number to round.

dec
The number of digits up to which to round num. If you omit dec, ROUND( ) assumes 0.

Returns A number rounded to a specified number of digits.

Example The following example rounds the numbers in the PriceEstimate data field to return an integer. For example, if the PriceEstimate value is 1545.50, ROUND( ) returns 1546. If the PriceEstimate value is 1545.25, ROUND( ) returns 1545.

```
ROUND([PriceEstimate])
```

The following example rounds the numbers in the PriceEstimate data field to one decimal place. For example, if the PriceEstimate value is 1545.56, ROUND( ) returns 1545.6. If the PriceEstimate value is 1545.23, ROUND( ) returns 1545.2.

```
ROUND([PriceEstimate], 1)
```

The following example rounds the numbers in the PriceEstimate data field to one digit to the left of the decimal point. For example, if the PriceEstimate value is 1545.56, ROUND( ) returns 1550. If the PriceEstimate value is 1338.50, ROUND( ) returns 1340.

```
ROUND([PriceEstimate], -1)
```

ROUNDDOWN( )

Rounds a number down to a specified number of digits.

Syntax ROUNDDOWN(num)

ROUNDDOWN(num, dec)

Arguments

num
The number to round down.

dec
The number of digits up to which to round num down. If you omit dec, ROUND( ) assumes 0.

Returns A number rounded down to a specified number of digits.

Example The following example rounds down the numbers in the PriceEstimate data field to return an integer. For example, if the PriceEstimate value is 1545.25, ROUNDDOWN( ) returns 1545. If the PriceEstimate value is 1545.90, ROUNDDOWN( ) returns 1545.

```
ROUNDDOWN([PriceEstimate])
```

The following example rounds down the numbers in the PriceEstimate data field to one decimal place. For example, if the PriceEstimate value is 1545.56,

ROUNDDOWN( ) returns 1545.5. If the PriceEstimate value is 1545.23, ROUNDDOWN( ) returns 1545.2.

```
ROUNDDOWN([PriceEstimate], 1)
```

The following example rounds the numbers in the PriceEstimate data field down to one digit to the left of the decimal point. For example, if the PriceEstimate value is 1545.56, ROUNDDOWN( ) returns 1540. If the PriceEstimate value is 1338.50, ROUNDDOWN( ) returns 1330.

```
ROUNDDOWN([PriceEstimate], -1)
```

ROUNDUP( )

Rounds a number up to a specified number of digits.

Syntax ROUNDUP(num)

ROUNDUP(num, dec)

Arguments

num
The number to round up.

dec
The number of digits up to which to round num up. If you omit dec, ROUND( ) assumes 0.

Returns A number rounded up to a specified number of digits.

Example The following example rounds up the numbers in the PriceEstimate data field to return an integer. For example, if the PriceEstimate value is 1545.25, ROUNDUP( ) returns 1546. If the PriceEstimate value is 1545.90, ROUNDUP( ) returns 1546.

```
ROUNDUP([PriceEstimate])
```

The following example rounds up the numbers in the PriceEstimate data field to one decimal place. For example, if the PriceEstimate value is 1545.56, ROUNDUP( ) returns 1545.6. If the PriceEstimate value is 1545.23, ROUNDUP( ) returns 1545.3.

```
ROUNDUP([PriceEstimate], 1)
```

The following example rounds up the numbers in the PriceEstimate data field to one digit to the left of the decimal point. For example, if the PriceEstimate value is 1545.56, ROUNDUP( ) returns 1550. If the PriceEstimate value is 1338.50, ROUNDUP( ) returns 1340.

```
ROUNDUP([PriceEstimate], -1)
```

SEARCH( )

Finds the location of a substring in a string. The substring can contain wildcard characters.

Syntax SEARCH(pattern, str)

SEARCH(pattern, str, startPosition)

Arguments

pattern
The string pattern to search for. You must enclose the pattern in double quotation marks (" "). You can use the following special characters in a pattern:

- An asterisk (*) matches zero or more characters, including spaces. For example, t*n matches tn, tin, and teen.
- A question mark (?) matches exactly one character. For example, t?n matches tan, ten, tin, and ton. It does not match teen or tn.

str
The string in which to search.

startPosition
The position in str where the search starts.

Returns The numerical position of the string pattern in the string. The first character of a string starts at 1. If the substring is not found, SEARCH( ) returns 0.

Example The following example searches for the string pattern, S*A, in each product code. If the product name is KBS5412A, SEARCH( ) returns 3.

```
SEARCH("S*A", [ProductCode])
```

The following example uses SEARCH( ) in conjunction with the LEFT( ) function to display the characters that precede the first space character in a product name. The LEFT( ) function extracts a substring of a specified length, starting from the first character. In this example, the length of the substring to display is equal to the numerical position of the space character.

```
LEFT([ProductName], SEARCH(" ", [ProductName]))
```

If the product name is 1969 Ford Falcon, the expression returns 1969.

SQRT( )

Calculates the square root of a number.

Syntax SQRT(num)

Argument **num**
The number, or numeric expression that specifies the number, for which you want to find the square root. The number must be a positive number.

Returns A number that is the square root of num.

Example The following example calculates the square root of each value in the LotSize data field:

```
SQRT([LotSize])
```

The following example uses SQRT( ) to calculate the actual distance traveled uphill, given the base distance and elevation values. This example applies the Pythagorean theorem, which states that $a^2 + b^2 = c^2$. Using this theorem, the actual distance traveled is c, which means we want to calculate:

$c = \sqrt{a^2 + b^2}$

which translates to the following expression:

```
SQRT((([Distance] * [Distance]) + ([Elevation] * [Elevation])))
```

TODAY( )

Returns the current date that includes a time value of midnight, 12:00 AM.

Syntax TODAY( )

Returns The current date in the following format:

```
Sep 25, 2008 12:00 AM
```

Example The following example calculates the number of days from the current date to Christmas:

```
DIFF_DAY(TODAY(), "12/25/08")
```

The following example calculates the number of years from each value in the HireDate data field to the current date:

```
DIFF_YEAR([HireDate], TODAY())
```

TRIM( )

Removes the leading and trailing blanks from a specified string. TRIM( ) does not remove blank characters between words.

Syntax TRIM(str)

Argument **str**
The string from which to remove leading and trailing blank characters.

Returns A string with all leading and trailing blank characters removed.

Example The following example uses TRIM( ) to remove all leading and trailing blank characters from values in the FirstName and LastName data fields. The expression uses the & operator to concatenate each trimmed FirstName value with a space, then with each trimmed LastName value.

```
TRIM([FirstName]) & " " & TRIM([LastName])
```

TRIMLEFT( )

Removes the leading blanks from a specified string.

Syntax TRIMLEFT(str)

Arguments **str**
The string from which to remove the leading blank characters.

Returns A string with all leading blank characters removed.

Example The following example concatenates a literal string with each value in the customerName data field. TRIMLEFT( ) removes all blank characters preceding the customerName value so that there are no extra blank characters between the literal string and the customerName value.

```
"Customer name: " & TRIMLEFT([customerName])
```

TRIMRIGHT( )

Removes the trailing blanks from a specified string.

Syntax TRIMRIGHT(str)

Argument **str**
The string from which to remove the trailing blank characters.

Returns A string with all trailing blank characters removed.

Example The following example concatenates each value in the Comment data field with a semicolon, then with a value in the Action data field. TRIMRIGHT( ) removes all blank characters after the Comment value so that there are no extra blank characters between the Comment string and the semicolon.

```
TRIMRIGHT([Comment]) & "; " & [Action]
```

UPPER( )

Converts all letters in a string to uppercase.

Syntax UPPER(str)

Argument **str**
The string to convert to uppercase.

Returns The specified string in all uppercase letters.

Example The following example displays all the string values in the customerName data field in all uppercase:

```
UPPER([customerName])
```

WEEK( )

Returns a number from 1 to 52 that represents the week of the year.

Syntax WEEK(date)

Argument **date**
The date or date expression whose week of the year to get.

Returns A number that represents the week of the year for the specified date value.

Example The following example gets the week number of the year for each date value in the ShipDate data field:

```
WEEK([ShipDate])
```

WEEKDAY( )

Returns the day of the week for a specified date value.

Syntax WEEKDAY(date, option)

Arguments **date**
The date or date expression from which you want to get the day of the week.

option
A number that represents the weekday format to return. Use one of the following values:

- 1 to get the day as a number from 1 (Sunday) to 7 (Saturday).
- 2 to get the day as a number from 1 (Monday) to 7 (Sunday).
- 3 to get the day as a number from 0 (Monday) to 6 (Sunday).
- 4 to get the full weekday name, for example, Wednesday. The result is locale-specific.
- 5 to get the abbreviated weekday name, for example, Wed. The result is locale-specific.

If you omit option, WEEKDAY( ) assumes option 1.

Returns The day of the week for a specified date value.

Example The following example gets the full weekday name for each date value in the DateSold data field:

```
WEEKDAY([DateSold], 4)
```

YEAR( )

Returns the four-digit year value for a specified date value.

Syntax YEAR(date)

date
The date or date expression from which you want to extract the year part.

Returns The number that represents the four-digit year for the specified date value.

Example The following example gets the four-digit year for each date value in the ShipDate data field, and adds 15 to the four-digit year. For example, if the ShipDate value is Sep 16, 2008, YEAR( ) returns 2023.

```
(YEAR([ShipDate]) + 15)
```

Functions used in aggregate calculations

This section describes the range of functions that perform aggregate calculations. In Report Studio, you can perform aggregate calculations across the data rows in a group, section, or across an entire report table, as shown in Table 13-1.

Table 13-1 Aggregate functions

Aggregate function	Description
AVERAGE	Returns the average, or mean for a set of data rows. For example, if a report column contains values 5, 2, 7, and 10, AVERAGE returns 6.
COUNT	Counts the number of data rows. If a column contains values 5, 2, 7, and 10, COUNT returns 4.
COUNTVALUE	Counts the number of unique values in a set of data rows. If a report column contains values 5, 2, 5, 7, and 10, COUNTVALUE returns 4.
FIRST	Returns the first value in set of data rows. If a report column contains data rows 5, 2, 7, and 10, FIRST returns 5.

Table 13-1 Aggregate functions (continued)

Aggregate function	Description
LAST	Returns the last value in a set of data rows. If a report column contains data row values 2, 5, 7, and 10, LAST returns 10.
MAX	Returns the largest value in a set of data rows. If a report column contains data row values 5, 2, 7, and 10, MAX returns 10. For string values, MAX returns the last alphabetical value. For date values, MAX returns the latest date.
MEDIAN	Returns the median, or middle value in a set of data rows. If a report column contains values, 5, 2, 7, and 10, MEDIAN returns 6.
MIN	Returns the smallest value in a set of data rows. If a report column contains data row values 5, 2, 7, and 10, MIN returns 2. For string data, MIN returns the first alphabetical value. For date values, MIN returns the earliest date.
MODE	Returns the mode, or the value that occurs most frequently in a set of data rows. If a report column contains values, 5, 2, 5, 7, and 10, MODE returns 5.
QUARTILE	Returns the quartile value in a set of data rows, given a specified quart (0-4). A quartile can be defined as any three values that divide a set of values into four equal parts, such that each part represents 1/4 of the set of values. MIN, MEDIAN, and MAX return the same value as QUARTILE when quart is equal to 0, 2, and 4, respectively. If a set of data rows contains 50, 75, 80, 90, and 95, and you specify a quart of 2, QUARTILE returns 80.
STDDEV	Returns the standard deviation of a set of data rows. Standard deviation is a statistic that shows how widely values disperse from the mean value. If a set of data rows contains 50, 75, 80, 90 and 95, STDDEV returns 17.536.
SUM	Adds all the values in a set of data rows. If a report column contains 50, 75, 80, 90, and 95, SUM returns 390.

(continues)

Table 13-1 Aggregate functions (continued)

Aggregate function	Description
VARIANCE	Returns the variance of a set of data rows. Variance is a statistical measure expressing the size of the differences between the values. The variance increases as the differences between the numbers increase. If a set of data rows contains 50, 75, 80, 90, and 95, VARIANCE returns 307.5. If a set of data rows contains 5, 2, 5, 7, and 10, VARIANCE returns 8.7.
WEIGHTEDAVE	Returns the weighted average value in a set of data rows, given weights specified in another set of values. In a weighted average, each number is assigned a weight or degree of importance. These weights determine the relative importance of each number on the average. Grades are often computed using a weighted average. For example, for a set of scores 50, 75, 80, 90, and 95, with respective weights, 10, 25, 15, 30, and 20, WEIGHTEDAVE returns 81.75.

Operators

This section is a complete reference to all of the operators that you can use when you create expressions. This reference organizes the operators into the following categories:

- Operators in computed column expressions
- Operators in conditional formatting and filter condition expressions

Operators in computed column expressions

Table 13-2 lists the operators you can use when you write expressions for a computed column.

Table 13-2 Operators in computed column expressions

Operator	Use to	Example
+	Add two or more numeric values.	[OrderAmount] + [SalesTax]
-	Subtract one numeric value from another.	[OrderAmount] - [Discount]

Table 13-2 Operators in computed column expressions

Operator	Use to	Example
*	Multiply numeric values.	[Price] * [Quantity]
/	Divide numeric values.	[Profit]/12
^	Raise a numeric value to a power.	[Length]^2
%	Specify a percent.	[Price] * 80%
=	Test if two values are equal.	IF([ProductName] = "1919 Ford Falcon", "Discontinued Item", [ProductName])
>	Test if one value is greater than another value.	IF([Total] > 5000, [Total]*15%, [Total]*10%)
<	Test if one value is less than another value.	IF([SalePrice] < [MSRP], "Below MSRP", "Above MSRP")
>=	Test if one value is greater than or equal to another value.	IF([Total] >= 5000, [Total]*15%, [Total]*10%)
<=	Test if one value is less than or equal to another value.	IF([SalePrice] <= [MSRP], "Below or equal to MSRP", "Above MSRP")
<>	Test if two values are not equal.	IF([Country] <> "USA", "Imported product", "Domestic product")
AND	Test if two or more conditions are true.	IF(([Gender] = "Male" AND [Salary] >= 150000 AND [Age] < 50), "Match found", "No match")
OR	Test if any one of multiple conditions is true.	IF(([City] = "Boston") OR ([City] = "San Francisco"), "U.S.", "Europe and Asia")
&	Concatenate string values.	[FirstName] & " " & [LastName]

Operators in conditional formatting and filter condition expressions

Table 13-3 lists the operators you can use when you create expressions for conditional formatting and filter conditions.

Table 13-3 Operators in conditional formatting and filter condition expressions

Operator	Use to	Example
Between	Test if a column value is between two specified values.	Profit Between 1000 and 2000
Bottom N	Test if a column value is among the lowest *n* values.	SalesAmount Bottom N 10
Bottom Percent	Test if a column value is in the bottom *n* percent of all values.	SalesAmount Bottom Percent 5
Equal to	Test if a column value is equal to a specified value.	Country Equal to France
Greater Than	Test if a column value is greater than a specified value.	Total Greater Than 5000
Greater Than or Equal to	Test if a column value is greater than or equal to a specified value.	Total Greater Than or Equal to 5000
In	Test if a column value is in the list of specified values. Use to select more than a single comparison value.	Country In USA, Canada, Mexico
Is Blank	Test if a column value is blank (" "). This operator applies only to string values.	E-mail Is Blank
Is False	Test if a column value is false.	LoanApproved Is False
Is Not Blank	Test if a column value is not blank. This operator applies only to string values.	Email Is Not Blank
Is Not Null	Test if a column value is not a null value. A null value means that no value is supplied.	CreditLimit Is Not Null
Is Null	Tests if a column value is a null value. A null value means that no value is supplied.	CreditLimit Is Null
Is True	Test if a column value is true.	LoanApproved Is True
Less Than	Test if a column value is less than a specified value.	Total Less Than 5000
Less Than or Equal to	Test if a column value is less than or equal to a specified value.	Total Less Than or Equal to 5000
Like	Test if a column value matches a string pattern.	ProductName Like %Ford%

Table 13-3 Operators in conditional formatting and filter condition expressions

Operator	Use to	Example
Match	Test if a column value matches a string pattern.	ProductCode Match S20
Not Between	Test if a column value is not between two specified values.	Profit Not Between 1000 and 2000
Not Equal to	Test if a column value is not equal to a specified value.	Country Not Equal to France
Not In	Test if a column value is not in the specified list of values.	Country Not In USA, Canada, Mexico
Not Like	Test if a column value does not match a string pattern.	ProductName Not Like %Ford%
Not Match	Test if a column value does not match a string pattern.	Product Code Not Match S10
Top N	Test if a column value is among the top *n* values.	SalesAmount Top N 10
Top Percent	Test if a column value is in the top *n* percent of all values.	SalesAmount Top Percent 5

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