Crystal Reports® 2008

FOR DUMMIES®

by Allen G. Taylor

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About the Author

Allen G. Taylor is a 30-year veteran of the computer industry and the author of over 20 books, including *SQL All-in-One Desk Reference For Dummies, SQL For Dummies, Access 2003 Power Programming with VBA, Database Development For Dummies,* and *SQL Weekend Crash Course*. He lectures nationally on databases, innovation, and entrepreneurship. He also teaches database development internationally through a leading online education provider and teaches microprocessor architecture locally at Portland State University. You can contact Allen at `allen.taylor@ieee.org`.

Dedication

This book is dedicated to my daughter, Jenny Taylor Warren, who has given me much excellent advice, as well as two outstanding grandsons.

Author's Acknowledgments

Many people have contributed to the quality and content of this book. I would particularly like to recognize my Acquisitions Editor, Kyle Looper, for his overall management of the project and for keeping me honest, and my Project Editor, Rebecca Senninger, for the day-to-day coordination of the project.

I also appreciate the continued support of my family and the interest of my friends and colleagues. It would not have been possible to complete a project of this magnitude without the support of those close to me.

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Introduction

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Crystal Reports 2008 is the latest in a long and celebrated series of report writers for personal computers. Crystal Reports is by far the bestselling report writer package in the world, even though you might not know it by name. (It's been bundled with many of the most popular applications without being acknowledged by name. For example, a version of Crystal Reports is currently bundled into Microsoft's Visual Studio .NET.) However, Crystal Reports 2008 is available as a standalone product. And if you want to produce a high-quality report quickly, Crystal Reports is the top choice to do the job.

About This Book

Crystal Reports 2008 For Dummies is a book that gets you using Crystal Reports quickly and effectively. This book covers all the major capabilities of Crystal Reports but doesn't bog you down in intricate detail. The objective is to give you the information you need to produce the types of reports that most people need most of the time. I also get into some out-of-the-ordinary report types that you might be called upon to generate on occasion.

Use this book as a handy reference guide. Each chapter deals with an individual feature that you might need at one time or another. Pull out the book, read the chapter, and then do what you need to do. In many cases, step-by-step procedures walk you through commonly needed operations. You might find it worthwhile to put the book beside your computer and perform the operations while you read about them.

Anyone who might be called upon to produce a report based on database data can profit from the information contained in this book. It's also valuable for managers who might never produce a report but who oversee people who do. This book tells you what's possible, what you can do easily, and what takes a little more effort to accomplish. This knowledge can help you estimate how long it should take to produce reports of various types.

Conventions Used in This Book

When an instruction in the book refers to a command path — for instance, "Choose File➪Save" — that simply means to click your mouse button on File on the main menu, and then choose Save from the submenu that drops down from it.

Anything you see that is printed in a monospaced font is code, or something you'll run across in the course of programming a database. `This is a monospaced font.` Crystal Reports executes code that you enter as formulas or SQL statements.

What You're Not to Read

You can certainly choose to read this book from cover to cover, working through the examples, although you don't have to. Regardless of whether you read it all the way through in order, think of this book as a handy quick reference by your side when you want to perform a particular operation you haven't used in a while (or ever).

An upcoming section of this introduction explains the icons you'll normally run across, and there is a good reason for paying attention to each of them. However, consider yourself exempted from the requirement to read anything that appears by a Technical Stuff icon.

Material placed next to one of these icons might be interesting to techies like me (and like some of you out there) but generally isn't necessary for a full understanding of how to use Crystal Reports.

Foolish Assumptions

I've never met you, but I have to make a few assumptions about you and what you know. For example, I assume that you know how to use a personal computer and that you're somewhat familiar with Microsoft Word. If you know how to navigate Microsoft Word, you already know almost all there is to know about navigating Crystal Reports. The user interfaces of the two products are similar.

I assume that you've seen directory trees before, such as those extensively used in Microsoft Windows. You know that if you see a plus sign (+) to the left of a node that shows a folder (or other) icon, it means that you can click the plus sign to expand that node to see what the node contains. Crystal Reports treats directory trees in a similar way.

I assume you know how to perform a drag-and-drop operation with your mouse. In Crystal Reports, when you click an object and start dragging it, your progress is shown by a rectangular placement frame. When you release the mouse button to drop the item, the placement frame is replaced by a duplicate of the item that you dragged.

How This Book Is Organized

This book contains six major parts. Each part contains several chapters.

Part I: Reporting Basics

Part I introduces you to Crystal Reports and the art of report creation. You find out what a report should accomplish and what it should look like. Then you fire up Crystal Reports and use it to create a simple report based on data held in a database.

Part II: Moving Up to Professional-Quality Reports

You can do many things beyond the basics to make reports more focused, more readable, and easier on the eye. This part gives you the information you need to do all those things.

Part III: Advanced Report Types and Features

Part III gets into serious report creation. With the information in this part, you can zero in on exactly the data you want and display it in the most under-standable way. You'll be able to nest one report within another, pull report elements from multiple non-database sources, present multidimensional data in OLAP cubes, illustrate points with charts and maps, and create stunning visuals with Xcelsius and Flash. With these tools, you can produce reports fit for the eyes of the organization's CEO.

Part IV: Crystal Reports in the Enterprise

BusinesObjects Enterprise is a companion product to Crystal Reports that controls and secures the distribution of reports. With it, you can make your reports accessible to people on your local area network (LAN), or on the World Wide Web. BusinessObjects Enterprise is also the home of the Repository, which is a great place to store formulas or custom functions so they can be used again.

Part V: Publishing Your Reports

After you create a report, you'll want to make it available to the people who need it. Crystal Reports makes it easy for you to distribute your report for viewing, whether to colleagues in your organization or to Internet users around the world. In addition, you can publish your reports using traditional methods. You can print it; export it to a file, or fax it to people far away. After you complete report development, distribution is easy.

Although Crystal Reports does a great job when used all by itself, you can also incorporate it into applications written in a computer language. The Crystal Reports SQL Expression Fields facility gives you direct control over the data in a report's underlying database. Because a version of Crystal Reports is included as an integral part of the Microsoft .NET application development environment, you can incorporate the power of Crystal Reports into applications you write in Visual Basic, Visual C++, Visual C#, or any language compatible with the .NET framework. This gives the applications you write the sophistication of the world's leading report writer.

Part VI: The Part of Tens

It's always good to remember short lists of best practices. That's what The Part of Tens is all about. Listed here are pointers that help you produce outstanding reports with minimum effort, in the shortest possible time.

Icons Used in This Book

Tips save you a lot of time and keep you out of trouble.

Pay attention to the information marked by this icon because you might need it.

As I mention earlier, Technical Stuff icons denote detail that I find interesting (and you might, too). However, if you don't, no big deal. These nuggets aren't essential to gain an understanding of the topic being discussed. Skip them if you like.

Heeding the advice that this icon points to can save you from major grief. Ignore it at your peril.

Where to Go from Here

Now you're ready to start finding out about using Crystal Reports 2008 to create professional-quality reports based on data stored in your databases. After all, Crystal Reports 2008 is the latest version of the most-popular report writer in the world. You can use it to quickly whip out simple reports, or you can take a little longer and generate a world-class executive report.

Part I
Reporting Basics

"Well, there's your drawing scanned into your book report. I just can't figure out what that grey fuzzy thing is along the edge."
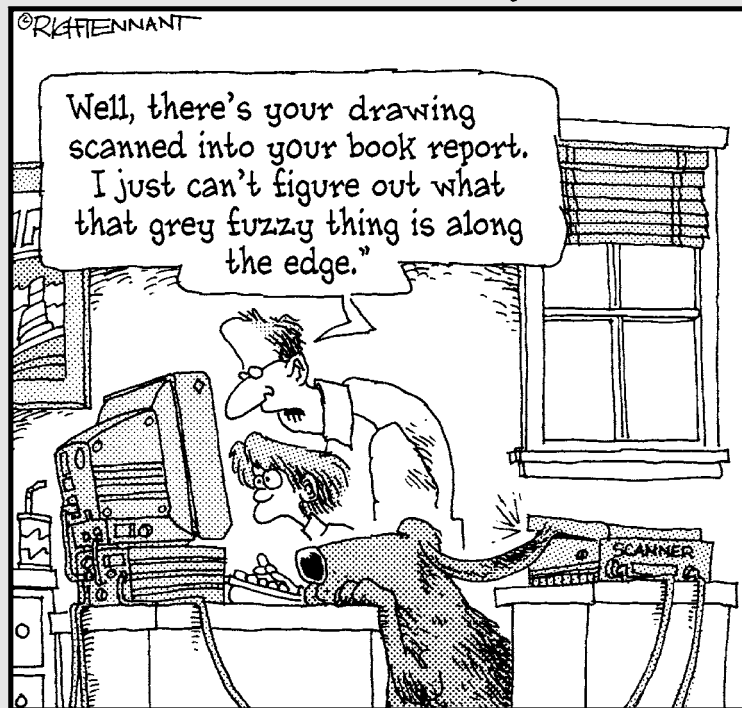
In this part . . .

There's data in them thar databases, where it's not doing anyone any good by itself. And your manager wants a coherent report, based on that data, on her desk by the close of business today. What should you do? Panic? Consider joining the Foreign Legion?

You don't need to do anything that drastic. The chapters in this part tell you how to quickly crank out the report your boss so desperately needs. This part offers you just what you need to know to put the needed information on the boss' desk before the lights go out tonight. And you'll start to build your reputation as a person who can deliver the goods when the pressure is on.

Chapter 1

Transforming Raw Data into Meaningful Information

In This Chapter

▶ Outlining the major features of Crystal Reports 2008

▶ Viewing an existing report

*C*omputers can store and process enormous amounts of data, and with the relentless advance of technology, those capabilities will soon become even more mind-boggling. Even now, the major challenge of getting value from computer systems isn't to make them more powerful but rather to harness the power they already have and in a way that delivers useful information to people.

Megabytes or gigabytes of raw data are neither meaningful nor useful to people. Instead, you need organized information, distilled and focused on answering specific questions. In businesses and enterprises of all kinds, organizing and presenting information has traditionally been the job of documents called *reports.* These documents generally comprise multiple pages that can include text, numbers, charts, maps, and illustrations. The best reports convey the facts needed to make the best decisions, unobscured by a clutter of data irrelevant to the task at hand.

Crystal Reports, a leading report-writing application package for more than a decade, is by far the most commonly used report writer in the world. Many people have used Crystal Reports unknowingly for years because it's often integrated with other applications and not specifically identified by name.

Major Features of Crystal Reports 2008

Crystal Reports 2008 includes all the features that made Crystal Reports XI (its predecessor) a worldwide bestseller, plus it offers exciting new features that save you time and effort while you develop your reports. Crystal Reports 2008 is tightly integrated so that all the individual components of the system

work together seamlessly to support report creation, modification, and distribution. And the tight integration extends beyond Crystal Reports 2008 to BusinessObjects Enterprise, making the sharing of reports across large enterprises not only feasible but downright convenient.

The Explorers and Experts within Crystal Reports provide highly intuitive visual tools that step you through creating a report. Features such as the Repository (which applies to enterprise installations) and report templates allow users throughout the organization to reuse components or entire reports. There is never any need to reinvent the wheel. If a component in the Repository or a report template comes close to meeting your requirements but doesn't meet them exactly, you can easily make minor modifications and have a usable report quickly, which is a vast improvement over creating an equivalent component or report from scratch.

Formatting a report

The primary job of a report writer, such as Crystal Reports, is to take data from a database and put it into a pleasing, logical, and understandable format for viewing. With Crystal Reports, you are well equipped to give your reports the appearance you want — without having to become a formatting guru.

Crystal Reports offers both absolute and conditional formatting:

- ✔ *Absolute formatting* enables you to put text, titles, charts, maps, columns of figures, cross-tabs, and graphics pretty much anywhere you want on the screen. You can handle preprinted forms. You can optimize for screen display or for printing on paper. This is close to the ultimate freedom in report creation — but not quite.

- ✔ *Conditional formatting* takes you one step further toward the ultimate: Using it, you can change the format of the data you're displaying in response to the content of the data itself. With conditional formatting, every time the data in a report changes, a formula that you include in the report can make the appearance of the report change accordingly.

Chapter 8 covers absolute and conditional formatting.

One especially useful feature of Crystal Reports 2008 — carried over from earlier versions — is the Report Alert. Suppose that a value being displayed crosses a critical threshold that requires immediate action on the part of the report's target audience. When that threshold is crossed, not only is its value displayed, but also a Report Alert dialog box pops up that can't be ignored.

Another labor-saving feature is Template Expert, which enables you to create and save a report template for later use. Imagine how much time you'll save if you have to quickly format multiple reports with a common look. Turn to Chapter 8 for more about Template Expert.

Generating barcodes

Go anywhere today, and you are bound to see barcodes. Barcodes identify every product for sale in just about any store. They identify items of inventory in a company's warehouse. They identify the furniture in your office. They even identify the cows on dairy farms. The day may not be far off when they identify people. Now you don't need expensive, special purpose equipment to generate barcodes. Crystal Reports 2008 provides you with that capability, at a fraction of what it would normally cost. Actually, if you already own Crystal Reports, all it costs you is the label stock and the ink it takes to print on it. See Chapter 7 to find out how to include barcodes in your reports.

Enhancing a report with formulas and custom functions

Did I mention that conditional formatting makes use of formulas to change the format of a report? Well, you can use formulas for far more than that. A *formula* is like a little computer program that can do computations or other manipulations of data before displaying the result. This makes Crystal Reports more than merely a report writer that puts your data in a nice format. By using formulas, you can make your report select specific records (or groups of records) and display them the way you want, controlling that process by declaring and using variables in your formulas. All the common flow-control structures (`If-Then-Else`, `Select Case`, `For`, `While Do`, and `Do While`) are available.

And after you create a useful formula to use later, you can save it as a custom function. Custom functions are added to the standard functions that come with Crystal Reports, keeping them available in one place.

I discuss formulas in Chapter 10.

Getting visual with charts and maps

Crystal Reports has excellent capabilities for the graphical display of data. All the most commonly used chart types are available, so you can display your data in the most meaningful way. If you have geographical data, Crystal Reports can display it in maps that show countries, regions, provinces, or cities. A variety of methods are available to associate values with specific regions, including colors, symbols of various sorts, and even charts.

Chapter 15 shows how you can include a chart in your report; Chapter 16 covers maps.

Xcelsius integration

The Xcelsius design tool is a companion product that integrates tightly with Crystal Reports. You can use it to create What-if scenarios in which a change of input parameters causes an immediate change in visual indicators. You can instantly see the result of a proposed change, before you make it. Turn to Chapter 17 for more information about Xcelsius.

Adobe Flash integration

You can also include Flash animation files within a Crystal report, including dynamic charts, graphics, and even video. Data in the report can be displayed in a dynamic manner, using Flash. Crystal Reports 2008 makes it easy to include Flash content in your report. Chapter 17 gives some pointers on adding Flash animations to a Crystal report.

Displaying a report

Crystal Reports is designed for distribution in today's highly connected business environment. You can build reports that are optimized for viewing on computers attached to your organization's local area network (LAN). You can also put a report on the Web for folks viewing via Web connection and browser.

Distributing a report

You can get your report into the hands of its intended recipients in many ways — print and deliver, fax directly from your computer to a fax machine anywhere in the world, or export the report to a file.

If you choose the latter approach, Crystal Reports supports many output file formats, including HTML for viewing over the Web. At least one of these formats is bound to be readable by the people in your audience. The one caveat here is that if you export a report to any format other than the Crystal Reports native format (`.rpt`), you might lose some of the report's formatting in the process. You can even export directly to an application, such as Microsoft Word or Lotus Domino. In such a case, Crystal Reports launches the target application and opens your report in it.

Supplying Crystal Reports with data

As important as the output formats of a report are, the inputs to the report are equally important. Crystal Reports shines in this area, too. It accepts data from a wide variety of data sources, including personal computer databases (such as Microsoft Access) as well as enterprise-wide client/server databases (such as Oracle, IBM DB2, and Microsoft SQL Server). In fact, Crystal Reports can accept data from any ODBC-compliant database or any data source that complies with the Microsoft OLE DB standard. Essentially, if your data exists in a commonly used modern data source, Crystal Reports can use it.

The Lone Edition of Crystal Reports 2008

Whereas previous versions of Crystal Reports came in multiple editions, each aimed toward a different audience, Crystal Reports comes in only one edition, which contains the full feature set. Now, you will never be disappointed to find that the edition you bought doesn't do everything you want. You never need to upgrade as your requirements grow. One product does it all.

Viewing a Report

The majority of this book tells you how to create a new report from data in a database file, using Crystal Reports. It also tells you how to modify a report so you can create a new report (similar to, but distinct from, the existing one). These are concerns of the report designer. But what if you just want to *view* a report that has already been designed?

The world has many more people viewing reports than creating reports: maybe even you! No problem. Before I launch into telling you how to create reports in subsequent chapters of this book, I briefly describe the simple process of viewing reports that already exist.

Reading a printed report

Reading a printed report is obviously the simplest (but also the most limited) way to get the information you want. It doesn't take a lot of technical sophistication to read text and view charts and maps on a sheet of paper. People were doing so long before computers came along.

For some kinds of information, however, printed reports aren't as valuable as those you can view online. For example, printed reports aren't updated when the database from which they were derived is updated. Thus, printed reports might contain obsolete — thus misleading — information. This is a factor you must always bear in mind when basing decisions on printed reports.

Viewing a report with Crystal Reports

As you might expect, you can do more than just create or modify a report with Crystal Reports software: You can also view an existing report. This has some major advantages over reading a printed report, provided that you have Crystal Reports software installed on your computer:

- ✔ **The report is connected to the source database while the report is being viewed.** This is an obvious advantage. If the data in the database has changed since the last time you viewed it, you can refresh the report before you view it again by pulling current information from the database. Crystal Reports automatically checks the database to see whether it has been updated since the last time your report was run. If so, it asks whether you want to refresh the report with current data.

- ✔ **You can use the drill-down capability of Crystal Reports to selectively view the detail underlying summary reports.** This enables you to get an overview of the subject by viewing the summary, and then drill down into the specific parts that interest you for more detail. (For more on drill-down, see Chapter 6.)

- ✔ **Viewing a "live" report gives you access to the way Crystal Reports uses hyperlinks.** You can follow a hyperlink from one part of a report to another part, from one report to another report on the same computer, or from one report to a report on another computer on your network.

- ✔ **You can view reports that include color graphics or color text.** For the many people who don't have high-speed color printers, this provides a way to access the full richness of a report's contents.

To view an existing report (on a computer with Crystal Reports installed), follow these steps:

1. **Launch Crystal Reports from your computer's Start menu.**

   Crystal Reports appears, displaying the Start Page, as shown in Figure 1-1. You can choose to start a new report or open an existing report. Several existing reports that have been used recently are listed, or you can go to a larger list of report files if you don't see the one you want in the list. In addition, use any of the several tabs in the lower part of the screen to access a variety of helpful resources.

2. Select the report that you want to view and then click OK.

If you don't see the report you want, click Open File and use the Open dialog box to select any report available on the system.

Crystal Reports retrieves and displays the report, as shown in Figure 1-2.

Figure 1-1:
The Start Page offers several options.
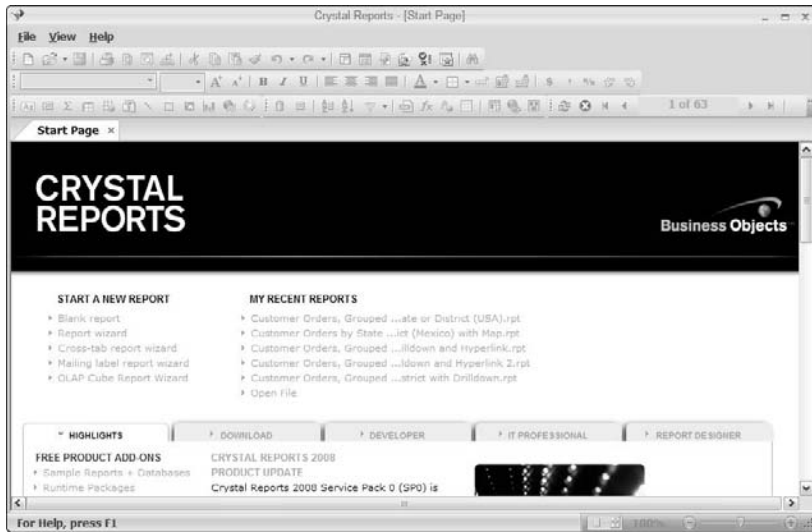
Figure 1-2:
Viewing a report is a snap.
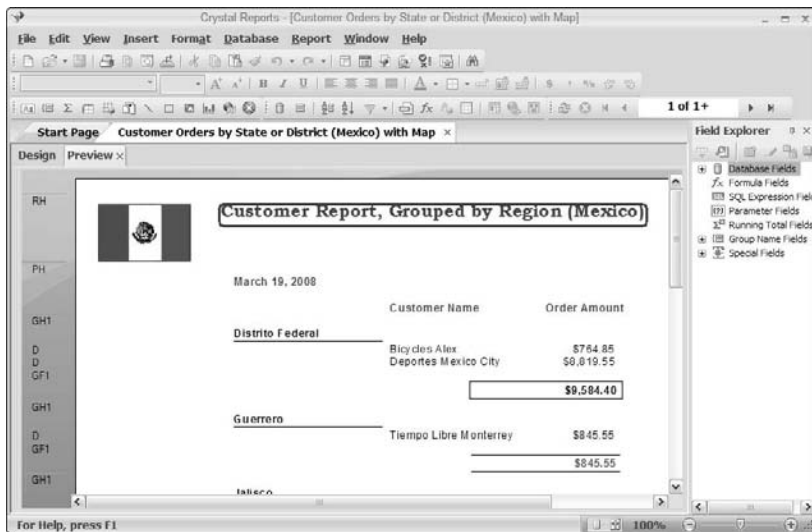
3. **Move through the report.**

   Scroll around the report, and move back and forth among its pages. You can drill down into any summary report that supports drill down. If the report contains hyperlinks, you can follow them to other locations in the report or in other reports.

4. **When you're finished viewing the report, choose File⇨Close to close it.**

Viewing a report on a LAN or on the Web

You can use Crystal Reports Server (a separate product) to display your reports to 20 simultaneous users on a LAN, or use BusinessObjects Enterprise to distribute the report to thousands of enterprise users or millions of users on the World Wide Web. Users on a LAN that's directly connected to Crystal Reports Server can use the free Crystal Reports Viewer to access the reports they need.

Users on the Web can view reports with a standard Web browser, such as Internet Explorer or Firefox.

Chapter 2

Create a Simple Report Right Now!

*W*hen you start Crystal Reports, you generally want to do one of three things:

  ✔ Create a report.

  ✔ Modify a report.

  ✔ Run a report against the data in your database.

You use *reports* to take data from a database and then process, format, and finally output that data to a printer, computer screen, or Web site.

You probably chose Crystal Reports because you have a database that contains information that's important to you. In all likelihood, the data in that database changes with time, and you want to be able to keep up with its current status. Sure, you *could* retrieve the information you want by making SQL queries, but that would be too much like work. It's far better to create a report with Crystal Reports, and then run the report whenever you want the latest status of the information of interest. You need to create the report only once, and then you can run it many times, getting the latest results with each successive run. You don't have to learn SQL or any other method of pulling data from a database. Reports created with Crystal Reports are easy to build, easy to read, and easy to understand. What could be better?

Crystal Reports gives you tremendous freedom in how you can lay out your report. It also gives you great latitude in what you include in the report. In addition to text and columns of numbers, you can include graphical images,

charts, graphs, and maps. You could even crank out a full-length science fiction novel with Crystal Reports if you wanted to (although other tools are better suited to that task).

In this chapter, I walk you through building your first report from scratch, using the Crystal Reports sample data as its basis. The sample's tables are filled with data that you can manipulate and display with Crystal Reports. You can use this sample data as the basis for your first report. And if you're not exactly sure what you need to choose from the sample database in this first-run report, don't worry: I take you through all your choices, including which tables and what data items to use, how to manipulate the data, formatting the report, and ways to output the report.

First Things First: Finding the Sample Database

Crystal Reports has a sample database you can use for practice. It's a Microsoft Access database for a fictitious bike shop, named Xtreme Mountain Bikes, Inc. If you don't have a copy of `xtreme.mdb` on your computer, you can download a copy (a Zip file) from the Business Objects Web site at

```
http://support.businessobjects.com/downloads/samples.asp
```

Unless you recently downloaded the sample database, you probably have an older version of `xtreme.mdb`. This older version works fine. With the 2008 release, Business Objects made a serious attempt to reduce the "installation footprint" of the product. To do that, Business Objects left out a number of files that had been included in earlier versions. Many of these (including `xtreme.mdb`) are available for download from the Business Objects Web address.

The `xtreme.mdb` database contains a number of database tables that are representative of the tables that a real-world bike wholesaler might maintain. As I mention earlier, these tables are filled with sample data that you can manipulate and display with Crystal Reports.

Starting Crystal Reports 2008

The first step when creating a report is to launch Crystal Reports from the Windows Start menu. When you do, the Crystal Reports Start Page appears, shown in Figure 2-1.

What's a database?

If you're using Crystal Reports to report on the contents of a database, you need to know what a database is. In the loosest sense, a database can be any collection of data items organized in any way. Crystal Reports can deal with data in several formats, but primarily it deals with the data in relational databases. *Relational databases* contain data in one or more tables that are organized like spreadsheets, with rows and columns. Each table contains data items that are related to each other. One table might contain data on a company's customers. Another might contain data on the company's products. Each column in a table deals with a specific attribute, such as a customer's last name or a product's unit price. Rows in a table would contain the information on a specific data element, such as Ms. Jones in the customer table or bicycle in the product table. The columns in a table are sometimes called *attributes* or *fields.* The rows in a table are sometimes called *records.* Don't be confused if you see these terminologies intermixed. They are often used interchangeably by database practitioners.

You can choose from among five different ways to start a new report. You can create a Crystal Reports document by using one of several wizards or by starting with a blank report. Alternatively (as I demonstrate in Chapter 1), you can open a report that already exists, either to change it or to run it.

Although using the wizard can be a time- and labor-saver, it does constrain the form of a report. The special-purpose report wizards, such as the Cross-tab Report Wizard, are great for creating certain specialized reports. This chapter takes you right to the point and shows you how to create a report *your* way, starting from a blank report instead of using a report wizard.
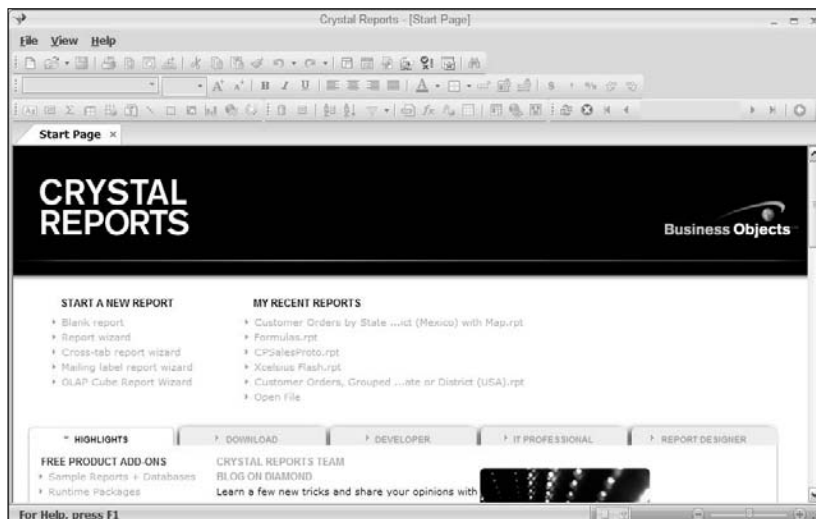
Figure 2-1:
Welcome to Crystal Reports!

Creating a Report with the Blank Report Option

As I allude in the introduction of this chapter, here's what you need to decide upfront when creating a report:

✔ Which tables in the database contain the data you want

✔ Which data items you want from those tables

✔ What manipulations of the data to perform to give you the information you want

✔ How you want your report to be formatted

✔ Whether the users of your report will retrieve it from a black-and-white printer, color printer, local computer screen, or Web site

For now, imagine you already know all those things.

To create a report from scratch, follow these steps:

1. **Start Crystal Reports.**

   The Crystal Reports Start Page appears; refer to Figure 2-1.

2. **Select the Blank Report option.**

   The Database Expert dialog box appears, as shown in Figure 2-2, which shows you possible places to find the source of your data.

Figure 2-2:
The Database Expert dialog box shows where to find your source data.
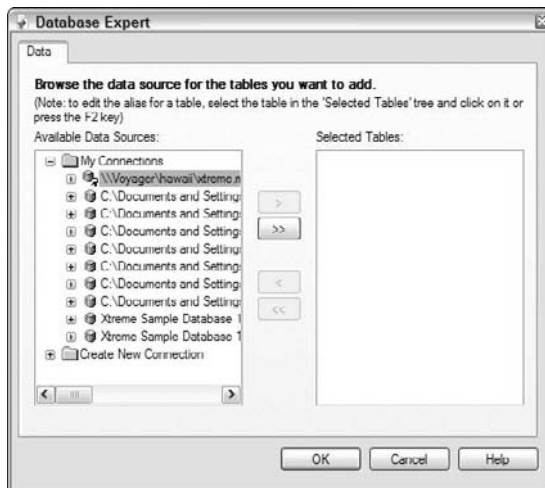
3. In the Available Data Sources pane, click the plus sign to the left of the Create New Connection folder to expand it.

REMEMBER

This is the folder you choose when you create a report from scratch. Once you have connected to a database, Crystal Reports remembers where it is from then on.

4. Double-click the database type that matches your data source.

WARNING!

Crystal Reports recognizes a variety of different database types.

You must select the right type. If you don't know which type is correct, ask someone familiar with the data source.

To follow along with this example, double-click Access/Excel (DAO). The Access/Excel (DAO) dialog box appears, as shown in Figure 2-3.

Figure 2-3:
The Access/ Excel DAO dialog box asks how to connect to your data source.

5. Click the ellipsis (...) button to the right of the Database Name field.

REMEMBER

The Open dialog box appears. If you are lucky, it displays the folder that contains the xtreme.mdb database file. The sample database — xtreme.mdb — is located wherever you placed it after you downloaded it. You might have to browse to find this file on your system.

6. Locate the `xtreme.mdb` on your computer and click the Open button to open the database file and dismiss the Open dialog box. Then, back in the Access/Excel (DAO) dialog box, click Finish.

Database Expert reappears, as shown in Figure 2-4, with the xtreme.mdb database connected. You can tell the connection is successful if you see Add Command, Tables, Views, and Stored Procedures listed below the connection in the Available Data Sources pane.

7. **Expand the Tables node, and then double-click the table on which you want to base your report.**

   To follow along with the example, double-click Product.

   The reference is moved to the Product table from the Available Data Sources pane to the Selected Tables pane as shown in Figure 2-5.

8. **Click OK to close Database Expert.**

   A blank report fills the window, as shown in Figure 2-6.
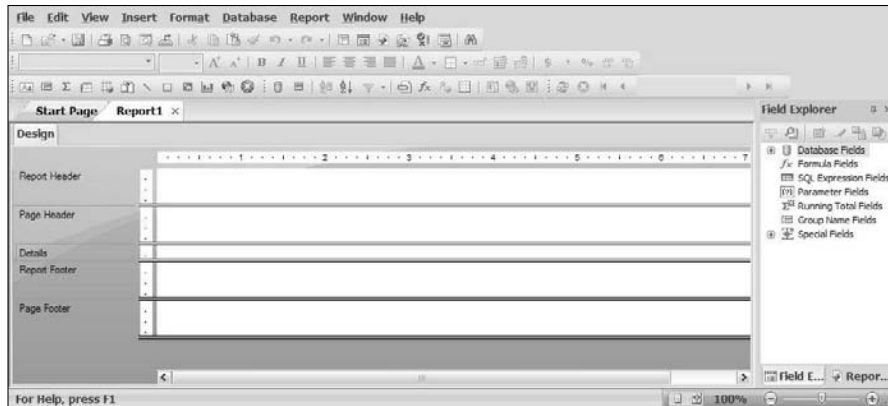
Figure 2-6:
A blank
report.

The Design tab (on the left edge) shows five sections of the report:

- ✔ **Report Header:** Appears only at the top of the report; the first thing that a viewer sees
- ✔ **Page Header:** Appears below the report header and at the top of all other pages in the report
- ✔ **Details:** The actual content of the report
- ✔ **Report Footer:** Appears after the last detailed information in the report
- ✔ **Page Footer:** Appears at the bottom of every page of the report

The toolbars at the top of the window give you immediate access to the major features of Crystal Reports. You are probably already pretty familiar with the first two toolbars, the Standard toolbar and the Formatting toolbar. They are similar to the corresponding toolbars on any Windows application, with a few additional items are specific to Crystal Reports. If you hover your cursor over any of these, a tooltip appears, telling you what each one is.

The third toolbar actually combines three separate toolbars: the Insert Tools toolbar, the Expert Tools toolbar, and the Navigation Tools toolbar. Figure 2-7 shows these toolbars.

Figure 2-7:
The Insert
Tools (top),
Expert Tools
(middle), and
Navigation
Tools (bottom)
toolbars.
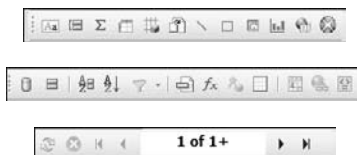
Allocating more space to the layout

Depending on the resolution of your computer screen, the Crystal Reports window might not display the full width of your report. You can give yourself a little more width in your display by changing one of the display options. Follow these simple steps:

1. **Choose File⇨Options.**

   The Layout tab of the Options dialog box appears, as shown in Figure 2-8. Think of this as Control Center for the appearance of your report.

2. **In the Design View section, select the Short Section Names check box.**

   This reduces the section names on the left edge of the window to one- or two-letter abbreviations, freeing up a little horizontal real estate.

3. **Click OK.**

4. **Drag the left edge of Field Explorer farther to the right.**

   You won't need Field Explorer right away. It's your primary tool for placing data into your report.

   This allocates more horizontal space to the work area, which allows you to view more of the report without resorting to horizontal scrolling.

Figure 2-8: Control the appearance of your report here.

Introducing your report

The Report Header area (at the top of the first page of the report) is the ideal place to tell the reader exactly what the report contains. However, this forces you, right here at the beginning, to *decide* what the report is to contain. No problem: Start by considering who your target audience is and what they want to know. (You can read more about making these decisions in Chapter 3.)

If you are Xtreme Mountain Bikes — and for this example, you are — the target audience for your Products report is potential customers. They surely will want to know what products you carry, including information on color and size, where appropriate. They probably want price information. They'll also need to know the stock number of an item so they can specify it properly when they decide to purchase a bike.

Adding a company logo to a report header

Placing your company logo in the report header also makes sense. Unfortunately, the Xtreme logo isn't available conveniently on the Crystal Reports distribution CD or on the Business Objects Web site. For the purposes of this demonstration, any logo-sized image file in one of the popular image file formats such as JPEG or GIF will do. BMP files are not supported, however. You can add one to the report header along with a title, such as *Product Price List*.

To add a logo to a report, do the following:

1. **Dismiss Field Explorer, if necessary, by clicking the X in its upper-right corner.**

2. **With the Design tab selected, click the Insert Picture icon on the Insert Tools toolbar.**

   You can find out the name of a toolbar icon (such as Insert Picture icon) by hovering your cursor over it. After a few seconds, a tooltip appears, telling you the name of the tool.

   A dialog box appears, displaying the image files in the Databases folder. I had no image files in my database folder, so I looked around until I found a sample report with the logo on it. I copied it, saved it to JPEG format, and then inserted it into my report. Perhaps you'll find a suitable image. Anything that is approximately the right size and shape is fine. Your organization's own logo would do, as would a drawing your child made.

3. **Click the picture's filename to select it, and then click the Open button. An outline of the logo appears on the report layout. Place it in the upper-left corner of the report header with the mouse, and then click to fix it in place.**

   Figure 2-9 shows the result.
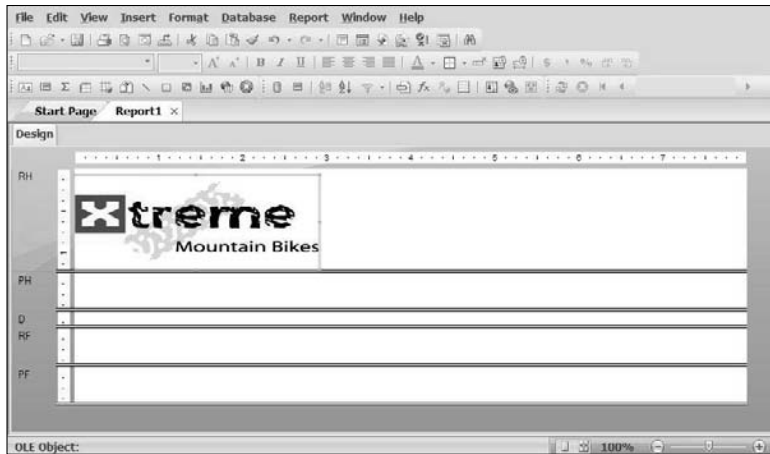
Adding a report title to your report header

Next, put a report title into the Report Header section. To do this, you use several tools from the Insert toolbar.

1. **Pull down the dividing line between the Report Header section and the Page Header section so that you can place the report title below the level of the logo.**

   To pull down a dividing line, hover the cursor over it until the cursor changes shape, click and hold the left mouse button, drag the line to where you want it, and then release the mouse.

2. **Click the Insert Text Object icon on the Insert Tools toolbar.**

   The cursor changes to a plus sign (+).

3. **Move the cursor into the Report Header section, just below the logo. Click the mouse button to establish the upper-left corner of the text box and then drag across the page and release the button at the lower right of the Report Header section.**

   A text cursor starts to blink inside the rectangle you created.

4. **At the blinking cursor's location, type the report title.**

   For the example, type **Product Price List**.

5. **Select the title you just typed, and then increase its size by clicking the Increase Font Size icon on the Formatting toolbar.**

6. **Make the title bold by clicking the Bold icon on the Formatting toolbar.**

7. **Click the Align Center icon to locate the title in the center of the page.**

    Your report should look similar to Figure 2-10.
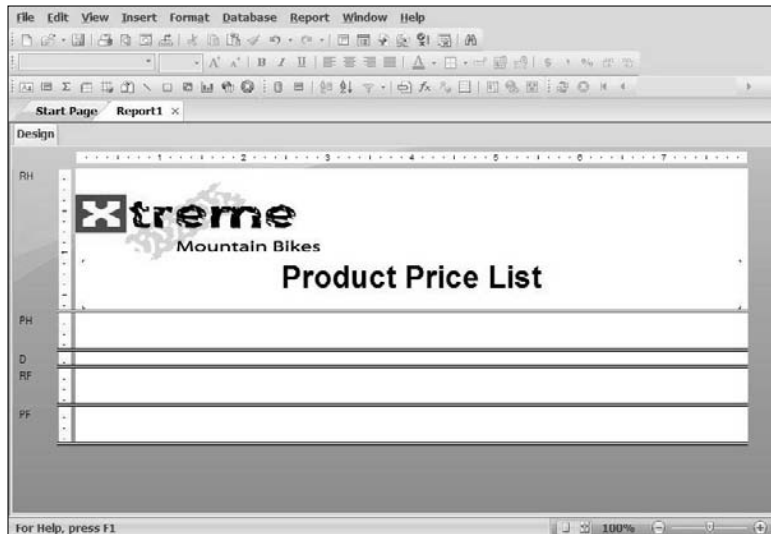
Figure 2-10: The report title is now in the Report Header section.

Choosing the fields that appear in your report

The next logical step is to place in the Details section the fields you want the report to display. Simply follow these steps:

1. **In Field Explorer, click the plus sign to the left of Database Fields; click the plus sign to the left of Product to display its fields.**

    Because the Product table is the only available data source, it's the only one listed.

    If Field Explorer isn't visible, choose View⇨Field Explorer from the main menu.

    Field Explorer displays the fields in the Product table, as shown in Figure 2-11.
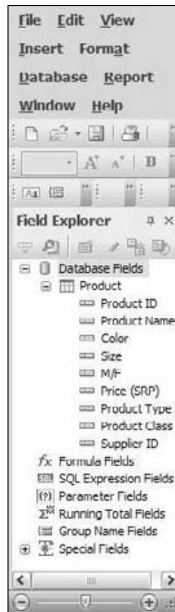
Figure 2-11:
The
contents
of the
Product
table.

2. **Click the first field that you want to include in the report, and then drag it to the left edge of the Details section.**

   For this example, click the Product ID field. When you drag the field, a rectangle appears. The field name appears in the rectangle in the Details section and also above it in the Page Header section. Later, you might want to change the column titles in the Page Header section for cosmetic reasons. For now, just leave the default column titles.

3. **Repeat Step 2 for any other fields that you want to include in the report.**

   For this example, place the Product Name, Color, Size, and Price (SRP) fields in order in the Details section, leaving just a little space between them.

   Crystal Reports 2008 automatically adjusts the fields displayed to match the field sizes you chose, and also spaces them proportionally. You can manually adjust the field sizes by grasping the handles on the left and right edges of the fields and moving them. Resize the fields and move them back and forth until you arrive at a good balanced appearance.

   At this point, your report layout should look similar to the one shown in Figure 2-12.
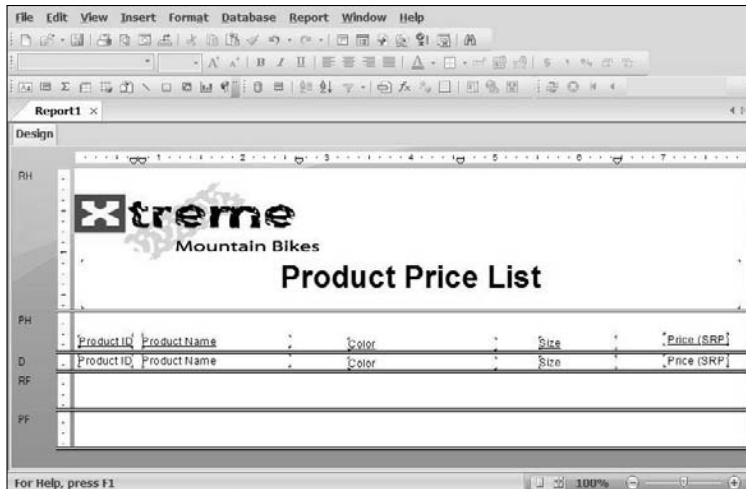
Improving the readability of page headers

Everything in the Page Header section appears just below the Report Header on the first page of the report and at the top of all following pages. By default, the field names in the Page Header section are displayed in a normal font and underlined. I think they look better in a bold font and not underlined, so I select the Bold attribute for each of them and deselect the Underline attribute. I'll wait to see what the report looks like before deciding whether I want to change the font size as well. Figure 2-13 shows the layout with the enhanced column headings.

Figure 2-13:
Modify
column
headings
to improve
their
appearance.
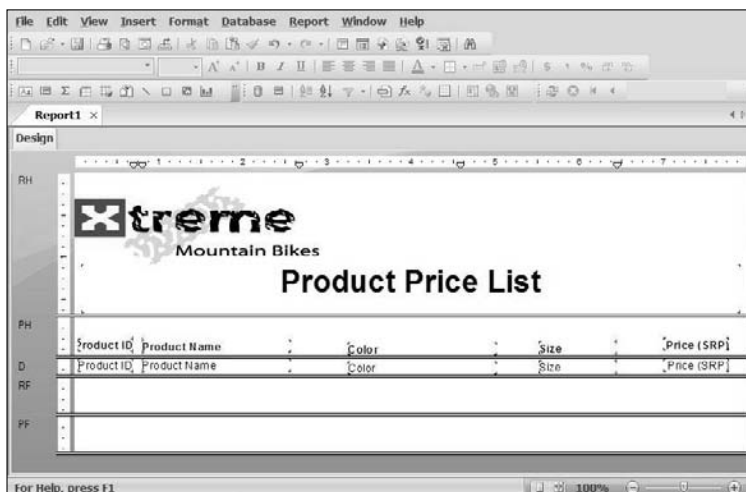
Previewing the report

So far, you've been able to see the layout of your report only in the sectioned structure of Design mode. To get a better idea of what the report looks like at this point, switch to Preview mode by clicking the Print Preview icon on the Standard toolbar. This displays the Preview tab in the upper-left corner of the work area and displays your report, complete with data pulled from the Products table. Figure 2-14 shows as much of the report as the screen can hold.

Note a few things about the report at this point.

✔ Crystal Reports automatically inserts commas between groups of three digits in number fields, such as the Product ID field. This is not what you want.

✔ The Product Name field isn't wide enough to display the full names of some products.

✔ The Color attribute must not apply to gloves because no color information is shown for the glove products (that you can see). For all we know, some gloves listed farther down in the report than is currently visible could have a color attribute.

Figure 2-14:
A preview of the Product Price List report.

The fact that gloves have no color isn't a problem, but the comma in the middle of the Product ID is a problem, as is the short field width. You can correct these as follows.

To fix the comma issue

1. **Click the Design tab to return to Design mode.**

2. **In the Details section, select the field whose number format you want to change.**

   For this example, right-click in the Product ID field.

3. **From the contextual menu that appears, choose Format Field.**

   Format Editor appears.

4. **From the Number tab, choose the numeric format that you want and then click OK.**

   For this example, you want the format with no commas, as shown in Figure 2-15. This changes the format of the Product ID field to eliminate the unwanted commas.

Figure 2-15:
Selecting a
different
numeric
format.

To fix the field width issue

    1. Back in Design mode, click in the Product Name box in the Details area to select it, and then move the cursor over the right edge of the box.

       The cursor changes to a two-headed arrow (<—>).

    2. Drag the right edge of the box further to the right, to allow more room for long product names.

Verify your changes by returning to Preview mode. The commas are gone, and the product names are now fully visible. By moving the sliders at the right and bottom edges of the report window, you can verify that all columns and rows are as they should be.

Page footers carry useful information

The bottom of each page offers you a great opportunity to display useful information, such as page number. (***Hint:*** If you've ever dropped a stack of reports off your desk, you know that page footers can be a valuable aid to putting them back in the proper order.)

When using the Product Price List, a report title and the date printed are valuable additions to the page footer. (Prices tend to change frequently in a fast-moving industry such as the mountain bike business, so the date of a price list is very important.)

In Design mode, follow these steps to create a page footer for your report that includes these three items (title, page number, and date printed).

Here's how to put useful information into a page footer:

    1. Back in Design mode, click the Insert Text Object icon on the Insert Tools toolbar.

       For this example, all the items you want to place in the page footer are text items.

    2. Place the text object rectangle in the Page Footer section and expand it to cover the full width of the page.

    3. Click the Align Center icon.

       You don't have any text yet, but you will.

4. **At the blinking cursor in the text field rectangle, type the report title, followed by a comma and a space.**

   Type **Product Price List,** for this example. then a comma and a space.

Next, place the current date and page number into the page footer:

1. **In Field Explorer, scroll down to Special Fields and expand it.**

   You expand a node by clicking the plus sign to its left.

2. **Click the Print Date icon or the Print Date name next to it, and drag it to the Page Footer area, right after the comma.**

3. **After the Print Date field is in position, type a comma and space after it, and then type** Page **followed by a hyphen.**

4. **In Field Explorer, click the Page Number icon or the name next to it, and drag it to the right of the hyphen.**

   This gives you an arrangement that looks much like Figure 2-16.

5. **Click the Preview tab at the top of the work area to switch to Preview mode.**

   The field names are replaced by actual values, as shown in Figure 2-17.
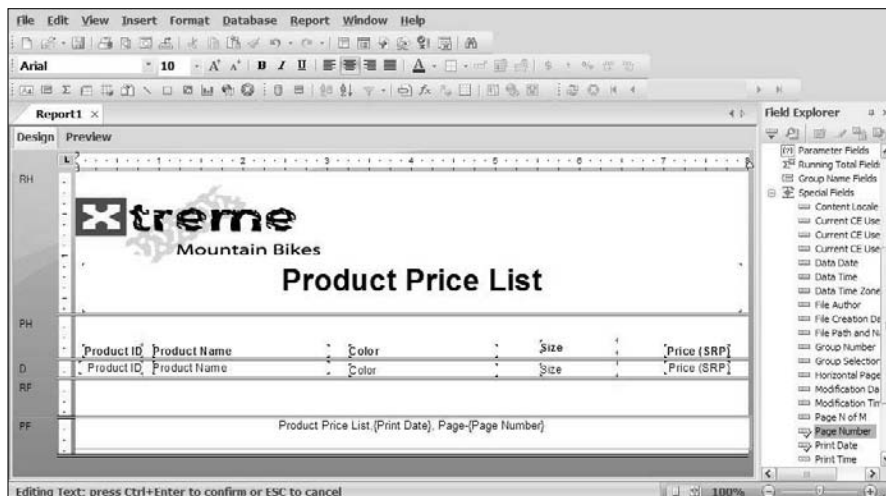
Figure 2-16: Create a page footer in Design mode.
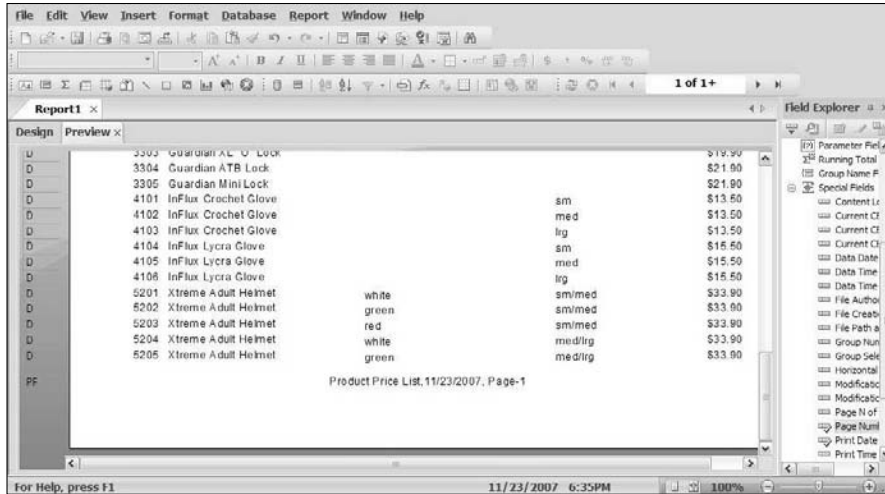
Figure 2-17:
Page footer
in Preview
mode.

Wrapping things up with a report footer

For some types of reports, you want a final item to close out the report, appearing after the last of the data on the final page. These are report footers, which are different than page footers. A *report footer* comes immediately after the last line of detail information but before the final page footer. This would be a good place, for example, to put a grand total for the entire report. If your report does not have a grand total, you can use this section in other ways.

To illustrate this feature of Crystal Reports, put a company slogan at the bottom of the Product Price List. Place the slogan *Xtreme Mountain Bikes Take You to the Limit* into the Report Footer section the same way that you put the report title into the Page Footer section. (See the preceding section for the details on how to do this.) The result, in Preview mode, looks like Figure 2-18.

Recording helpful information about your report

If you've followed this chapter to this point, the Product Price List report is essentially complete. Now you might want to generate some descriptive information about the report that's associated with the report but not normally printed or displayed. Crystal Reports has a provision for this. To add some descriptive information, follow these steps:

Figure 2-18:
Use a company slogan as a report footer.

1. **Choose File➪Summary Info.**

   The Document Properties dialog box appears.

2. **Fill in the text boxes with whatever information you want to associate with your report.**

   I added the information shown in Figure 2-19.

Figure 2-19:
Pertinent information about the Product Price List report.

3. **Click OK.**

   The document properties you entered are stored along with the report; they can be retrieved whenever anyone views the report with Crystal Reports.

Printing a Report

Printing a report from Crystal Reports is really easy. Open the report in Crystal Reports and then click the Print icon or choose File⇨Print⇨Printer. Print the report the same way you would print any document in Microsoft Windows.

Where to Go from Here

Sometimes the vision you have in your mind is not adequately reflected in the report you produce. Perhaps your vision isn't something that can be built in the real world. You can't do much about that. But you can do something about other reasons, such as not using Crystal Reports properly or not being aware of all its capabilities.

As I mention at the beginning of this chapter, Crystal Reports gives you tremendous freedom in how you can lay out your report as well as what you can include. Maybe text works better than columns of numbers, or your report might benefit from using graphical images.

The bottom line is this: If you feel sure that a report ought to be able to include something, you can almost certainly do it with Crystal Reports. This book tells you about many of the most powerful and useful features of Crystal Reports. If I don't mention a feature or capability that you'd like to use, it may nonetheless be available. Check the online help for additional information on advanced features. Crystal Reports is a product of Business Objects, an SAP company. More information on Crystal Reports can be found at www.businessobjects.com.

Chapter 3

Report Design Guidelines

*N*o book can tell you in a step-by-step manner exactly how to build the report you want. However, in this chapter, I show you some general principles of good report design as well as some common types of reports. From those general principles and examples, you can decide how best to design reports that meet your specific needs.

Defining an Effective Report Design

An effective report design depends on many factors:

✔ The data that the report draws from the database

✔ How the database is structured

✔ The level of detail that the users of the report require

✔ The purpose of the report

✔ The capabilities of the computer that displays or prints the report

✔ What the users of the report really need (understanding this is *critical*)

Defining Your Audience

Every report has a definite audience. Here's a key question to ask when you begin to develop any report: "Who will be reading this report?"

Some potential audience members might be familiar with the information that the report contains. These people might prefer a streamlined presentation of the data. Other audience members might be unfamiliar with the report content, so you might have to translate terms, use graphical devices (such as charts), and include explanatory text. If you have two such divergent audiences, consider producing two reports. Both contain the same information, just presented in different ways.

Other questions to ask are, "What information does the audience need, and in what form should it be delivered?" If your audience needs different sets of facts for different purposes, you might be better off creating several reports, each one focused on one specific purpose.

REMEMBER

Although writing a report with one consistent audience in mind is the best approach, sometimes you have to design a report for multiple audiences, each with its own needs. The challenge is to give each audience the information they need in a form they can easily understand, without handicapping the members of other audiences by subjecting them to irrelevant material. The key is to organize the information so members of each audience can quickly and easily find and understand the information of interest to them. Make sure to place critical information in a prominent place.

Defining the Report's Purpose

In addition to having a specific audience, your report should be restricted to one specific purpose — and accomplish that purpose by providing thorough, accurate, and timely information to the target audience. This information, more often than not, is the basis for important decisions that the readers of the report will make.

REMEMBER

Restricting a report to serving a single purpose does everyone a favor. Reports that cover multiple topics generally don't do justice to any one of them and tend to confuse readers. A good report covers a single topic and conveys a message that the reader can easily comprehend and act upon.

Knowing how important the report is to its audience can also affect the amount of time and effort you put into creating it. Is the report likely to be a basis for "bet-the-business" decisions? Or does it simply make visible some facts that are nice to know but not earth-shattering?

Another consideration is how often the report will be run. Some reports are one-shot affairs: run once against the database, never to be run again. Other reports are run repeatedly — say, weekly, monthly, quarterly, or yearly — and need the latest information in the database every time. Reports that are run

multiple times, by multiple people, deserve more attention to detail than reports run only once.

Choosing Content for Your Report

After you know who the report is for, and the kinds of decisions your audience wants to base upon the information in the report, it's time to decide exactly what information should be *in* the report. Leaving out distracting, irrelevant material is just as important as including material of interest.

The best reports are succinct and to the point, offering readers the information they want right away, minus the clutter of information they don't care about. Keeping in mind the audience and the purpose of the report, also consider what level of formality or informality is most appropriate.

If your report has to meet the needs of several audiences, shape its content along these lines:

- ✔ Determine which audience is the most critical.
- ✔ Determine which information is the most important to that audience.
- ✔ Display the most important information most prominently in the report.
- ✔ Put other, less-important information for the most critical audience in a nearby but subordinate position.
- ✔ For the other audiences, cluster the information in such a way that each group reading the report can find all the information it needs within a single area of the report.

Choosing the Report Appearance

After you determine your audience and what the report needs to contain, the next decision is how to present that information to that audience. Information can be presented in a report in many different ways — narrative text, tables of numbers, and (between those two extremes) various other methods, each effective in its own way for certain kinds of display.

For example, if you want to produce a report on video game sales figures, you would probably present the information in one format for game-industry executives and in an entirely different format for teenage video game enthusiasts. The information in both reports might be identical — but to be effective, the presentation of data should be vastly different.

Making a good first impression

The old adage goes that when you meet folks for the first time, they form an impression of you within the first 30 seconds. They decide whether they like you, trust you, or respect you. That snap judgment, based on 30 seconds of input, affects how they deal with you from then on.

Salespeople have known the truth about first impressions for a long time, which is why they "dress for success" when making a sales call. They want to make a good first impression so their prospect will be predisposed to like them, trust them, respect them, and buy from them. For all the same reasons, you want every report you create to make a good first impression so its readers buy into what you're selling: the information in your report.

One important way to make a good first impression is to make the appearance of your report appropriate for the audience and for the occasion. Know who your audience members are and what they expect this particular report to tell them. When they look at the first page of your report, it should immediately meet their expectations. They should see a clear indication of what the report is, and an engaging presentation of the information they're most interested in.

Thus, burying the most important information somewhere in the back pages of the report would be a mistake. For some reports, it may even be appropriate to state the conclusions that can be drawn from the data, right up front. It can encourage readers to dig deeper and digest the data pulled from the database that backs up your conclusions.

Deciding how best to present the information

The Report Creation Wizard, accessible from the Crystal Reports 2008 Start Page, gives you a total of six different ways to format your report: columnar, tabular, or justified layout, in either portrait or landscape orientation. For reports that don't have to impress anybody (or for quick-and-dirty reports that you intend to run only once), one of these six options is probably fine. I show you how to use the Report Creation Wizard in Chapter 4.

For more elaborate applications, your best bet is to create the report from the ground up, using Design view. Do that by specifying Blank report on the Start Page. In Design view, you have complete freedom to arrange the various report elements on the page. You also can use many more different kinds of report elements than the Report Creation Wizard allows, and add functionality way beyond merely displaying data from the database. Throughout this book, I show you sophisticated ways to give your report's readers the information they want, in the most effective way.

Choosing graphic elements for your report

If a picture is worth a thousand words, a graph is worth a lot more than a large table of numbers. Graphs and charts are valuable parts of any report that needs to show relationships between data items or trends in data. I discuss charts and graphs in Chapter 15. Some types of reports — such as those displaying sales figures for a product or for a family of products — have much more impact if they include graphs of the data along with the figures that back up the graphs. Other types (such as membership lists for organizations) won't benefit from graphs or charts.

Pictures — such as photographs, illustrations, line drawings, or even Flash animations — can greatly increase the value of some types of reports by presenting the information in an immediate, visual way. The more pathways into the brains of the readers you use, the more likely that they'll fully receive and appreciate your message.

If you think that a graph, chart, or other illustration would improve the understanding and acceptance of the content of a report, consider adding such an illustration. If you think such an addition would not improve things, then don't include one. Extraneous illustrations can distract from the message your report is supposed to convey.

Style communicates meaning, too

The text, numbers, and graphs in a report embody the data, but how these report elements are put together — as well as the judicious use of fonts, color, layout, and white space — can also make an impression on the reader. You want that impression to be favorable. Give some thought to how to use all these style elements together to create the desired effect.

You want to communicate with the reader on an emotional level as well as on an intellectual level. If, for instance, your report is designed to inform potential investors about the benefits of investing in your company, the report should convey an aura of professionalism but at the same time be consistent with the business you're in. The prospectus for an investment-banking firm should have a very different style from the prospectus for a cutting-edge video game company. Each should convey the idea that the company understands the business it's in, but the difference in industry dictates different presentation of company information. Reports should convey a style that readers would expect to see from the top organization in its field. Style adds credibility, on an emotional level, to the facts being presented.

Choose readable, appropriate fonts

Modern word processing software makes available to you an almost infinite variety of typefonts. You can also choose from among thousands of colors for your text, and font sizes that range from practically invisible to one where you can barely fit a single character on a page. Of course the traditional attributes of bold, italic, and underline are also available to you.

It is tempting to go wild with fonts for titles, column headings, text, and lists. The use of too many style elements can be distracting. Choosing a few good font styles that are appropriate to the content and the audience communicates your message better.

Pay attention to layout

Page layout can also either help or hinder comprehension. Don't try to cram too much onto a single page. Make judicious use of white space. Sometimes a background color other than white is a good idea. Always keep your target audience in mind. What kind of layout would be most appropriate for the people you are trying to reach? Ask yourself that question and then design your layout accordingly. Controlling report layout is something you have considerable control over if you start with a blank report. Your options are much more restricted if you use one of the report creation wizards.

Making sure your report conveys your message

Sometimes all a report needs to do is present facts in a straightforward way. Membership lists, price lists, and inventory lists fall into this category. Another category of reports, however, must do more to be effective. These reports try not only to give the reader information, but also to change the reader's thinking. To influence a reader, the sum of what's in the report should convey a uniform and unmistakable message. To make sure that point gets across, you may want to state it explicitly at the end of the report. Crystal Reports provides a space for a report footer, which is an ideal place for any such summarizing text. If appropriate, it might also include a call to action. You can read about report footer creation in Chapter 2.

Chapter 4

Starting Your Report

· ·

In This Chapter

▶ Using the report creation wizards

▶ Getting your report data

· ·

*Y*ou can start a report in any of several ways. Chapter 2, for example, shows how to create a report from scratch, starting with a blank report file. Another way is to use an existing report as a template; the new report has different content but is structurally similar to the existing report. Generally the quickest way is to use the Report Creation Wizard, which does much of the work for you but makes some assumptions that limit your options.

This chapter follows the speediest approach: I walk you step by step through building a report with the Report Creation Wizard. If you take this route, you do give up some freedom and flexibility (compared with the from-scratch approach), but you spend less time because the wizard does much of the work for you — fast.

Using the Report Creation Wizard

Using the Report Creation Wizard is often the best way to create a report that's conceptually simple and doesn't require unusual formatting or a custom appearance. The wizard is easy to access and offers a few standard layouts.

REMEMBER

If you produce a report that's close to one of the templates used by Standard Report Creation Wizard, it's usually quicker and easier than designing a report from scratch.

When you first launch Crystal Reports, it displays the Start Page. Several wizards are listed. For example, select the plain-vanilla one named Report Wizard. The wizard goes into action and displays the Standard Report Creation Wizard dialog box, as shown in Figure 4-1.
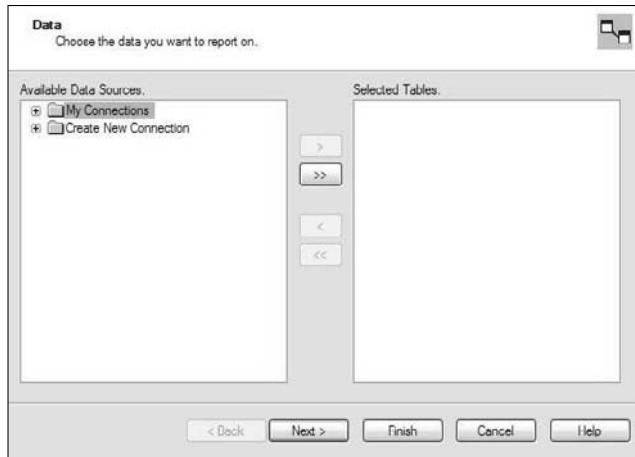
This looks very much like the Database Expert dialog box in Chapter 2; it acts in much the same way, too. Follow along to create a report with the wizard.

Creating a report with the Standard Report Creation Wizard

Start with a standard report, which is the one most people need most of the time. The example is from the fictitious Xtreme Mountain Bikes Inc., which is a business that sells mountain bikes and associated accessories. However, its information needs are much the same as the needs of any business that buys products from suppliers and sells them to customers. Thus, the kinds of standard reports that Xtreme needs are representative of the reports that many retail or wholesale businesses would find useful. All the data for Xtreme's reports is contained in the xtreme.mdb database file (see Chapter 2 for details about Xtreme).

Suppose that Xtreme's sales manager wants a report on all orders placed in December 2004. She wants the report to include the order date, order number, salesperson's name, and order amount. To build this report, data must be extracted from two different tables. Follow these steps to get it done:

1. **Start Crystal Reports.**

   The Welcome to Crystal Reports dialog box appears.

2. **Make sure that the Report Wizard option is selected, and then click OK.**

   The Standard Report Creation Wizard dialog box appears (refer to Figure 4-1).

3. **Connect to the target database (`xtreme.mdb`) if you are not already connected.**

   See Chapter 2 if you don't know how to connect to your database.

4. **Click the plus sign to the left of the database name, and then click the plus sign to the left of the Tables item.**

   A list of all the tables in the database displays.

   To follow along with the example, click the plus sign to the left of the Xtreme sample database, `xtreme.mdb`, and then click the plus sign to the left of the Tables icon. You see the names of the tables in the database, as shown in Figure 4-2.
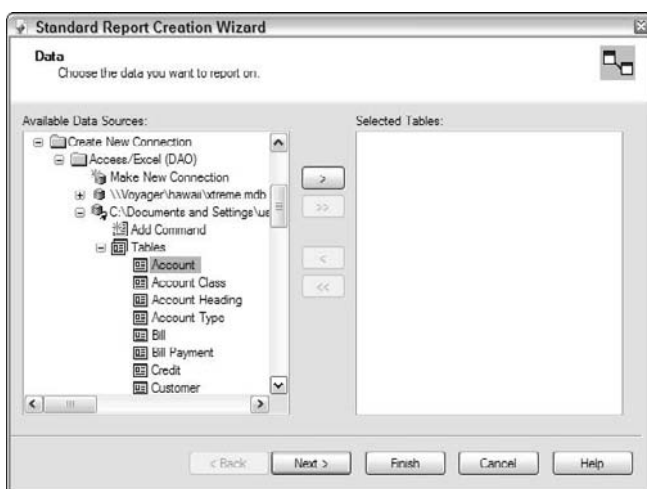
Figure 4-2: Database tables are listed.

5. **Select the tables that contain data that will be used by the report, moving them to the Selected Tables pane.**

   To follow along with the example, double-click the Orders table in the Available Data Sources pane to move it to the Selected Tables pane. Do the same for the Employee table.

6. **Click Next.**

   Standard Report Creation Wizard displays Link view.

The main pane in Link view shows the tables, along with the link between them. Figure 4-3 shows what Link view looks like at this point.

Figure 4-3:
Link view
of the
Standard
Report
Creation
Wizard
dialog box
shows the
connection
between the
selected
tables.

TIP

The Standard Report Creation Wizard has inferred that columns with the same name in different tables refer to the same objects — a valid assumption in this case, but this may not always be true. If any link that the wizard has assumed is incorrect, you can change it manually: Just click it to remove it, and then drag the pointer from the first table to the appropriate column in the second table add a new link.

After tables and links are arranged to your satisfaction, do the following to continue with the example:

1. **Click Next in Link view of the Standard Report Creation Wizard.**

   Fields view appears.

2. **From the selected tables in the Available Fields pane, select the fields you want for the report and click the > button to move them to the Fields to Display pane.**

   To follow along with this running example, choose the following:

   • *Employee table:* Select Last Name and First Name.

   • *Orders table:* Select Order ID, Order Amount, and Order Date.

   At this point, the Standard Report Creation Wizard looks like Figure 4-4.

3. **Click Next.**

   Grouping view appears.

4. **Because you don't want to do any grouping in this report, click Next.**

   Record Selection view appears. (See upcoming Figure 4-5.)

5. **Double-click the field in the Available Fields pane that you want to filter on to move it to the Filter Fields pane.**

Figure 4-4:
The fields
for the
report
have been
specified.

For this example, you want to filter out all orders that were *not* placed
during December 2004 (or December of whatever year your copy of
xtreme.mdb contains), so double-click the Orders.Order Date field.

**6. Pull down the list below the Filter Fields pane and select the method
for filtering. Then make any secondary filtering selections, if necessary.**

For the example, select *is between.* In the sublist, select the dates of the
first and last orders that were placed during December 2004 (as in
Figure 4-5). To illustrate the principle, you may select any month dis-
played in the xtreme.mdb database.

Figure 4-5:
Specify the
order date
for filtering.

7. **Click Finish.**

   The finished report is displayed, using the Preview tab in Crystal Reports, as shown in Figure 4-6. If Field Explorer is still displayed, you can dismiss it to show more of the right side of the report. (Read more about Field Explorer in Chapter 2.) You can also drag the left boundary of the report area farther to the left if needed.

Not a bad start, but you probably want to make it clear what this report is about by adding a report header; see Figure 4-7. You can also change column headings in the Page Header band if you want to. In general, you can use Standard Report Creation Wizard to do the bulk of the layout for a fairly standard report, and then fine-tune the result using the tools available on the Design tab. (Turn to Chapter 2 to add a report header.)

When you're satisfied with your report, save it by choosing File➪Save from the main menu. Later on, when you run the saved report, it reflects the state of the database at the time you saved it (the last time it was run). That's useful if you're reporting on historical data (as in the example report) or on data that changes on an ongoing basis.
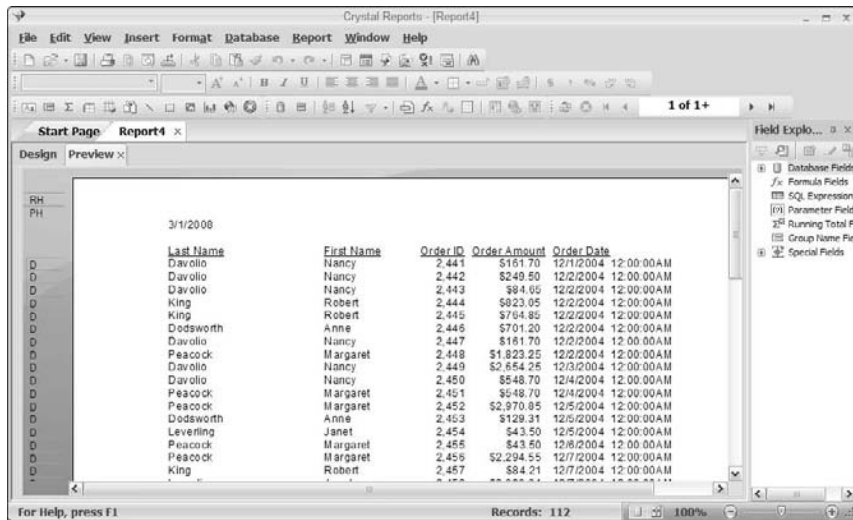
Figure 4-6: A standard report of December 2004 orders.

Figure 4-7:
Standard
report of
December
2004 orders,
with report
header.
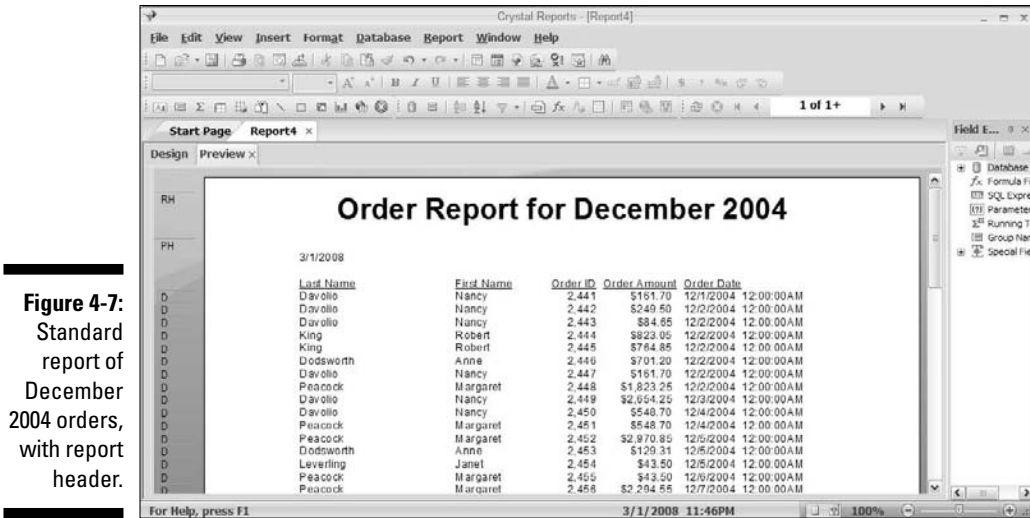
Using other report-creation wizards

Using the Standard Report Creation Wizard gives you a good idea of how Report Creation wizards work. The other report-creation wizards, which are accessible from the Start Page, have a lot in common with the Standard Report Creation Wizard, as follows:

- **Cross-tab Report Creation Wizard** builds a report that displays data as a cross-tab object. I cover cross-tab reports thoroughly in Chapter 16.

- **Mailing Labels Report Creation Wizard** automates laying out sheets of mailing labels. It's already set up for standard commercial label formats, but you can also design a custom label format.

- **OLAP Cube Report Wizard** displays OLAP (Online Analytical Processing) data as a grid. OLAP reports are similar to cross-tab reports but have different data sources and a distinctive data structure. (For more about OLAP and how to report on OLAP data, see Chapter 13.)

Starting with a Blank Report

Using report wizards can save you considerable time and effort. In many cases, however, starting with a blank report is the best choice if what you want doesn't jibe with what one of the report wizards is designed to produce.

You aren't limited to choosing one path or the other, though. Sometimes it makes sense to use the Standard Report Creation Wizard to generate the basic structure of your report, and then switch to the Design tab to modify the report into the final product.

Chapter 2 leads you step-by-step through the development of a basic report from a blank report. If you go that route, look there for pointers. In the following chapters, you can design and build a variety of reports, each one starting from a blank report. Later chapters of this book build upon mastering basic from-scratch report design.

Connecting Your Report to Its Data Source

Crystal Reports uses several methods to accept data from a variety of data sources. The software's wide data compatibility makes it a versatile tool that has uses beyond the creation of reports from data in relational databases.

Among others, Crystal Reports can accept data from direct-access database files, XML and Web Services, ODBC data sources, JDBC data sources, Java Beans connectivity, OLE DB data sources, OLAP files, and Salesforce.com files. Each type of file is accessed in a different way; Crystal Reports makes the connections for you.

Recycling an existing report

Few things are more frustrating than having to redo work. When asked to develop a report similar to one that already exists, some savvy report developers save time and effort by starting with an existing report, saving it under a new name, and then modifying it to serve a new purpose. This is a great time- and effort-saver if the modifications take less time and effort than building a new report from scratch.

If you foresee that a report that you've been asked to write could be the first of several similar reports, you can make those follow-on reports easier to create: Save a version of the first report containing only those elements that you believe will be common to all follow-on reports (be sure to save it under a new name). What you create by default is a template for the later reports — and a head start in producing them. After the template is safely stored on disk, you can add the elements to the original report that set it apart from all others that may follow.

Accessing database files directly

The fastest way to pull data from a database and include it in a report is through a direct-access interface. This makes sense because the fewer layers you have between the database and the report, the shorter the transit time as data goes from one to the other. Another advantage is the simple connection. As a report designer, you don't have to fuss with types of connections and middle-tier dynamic link libraries (DLLs). You just name the data source you want to tap for data, and tell Crystal Reports to go get that data.

However, as you know, There Ain't No Such Thing as a Free Lunch (TANSTAAFL). The price you pay for the speed and simplicity of a direct connection is the need for a different, highly customized driver *for every different data source.* This is usually not a problem because Crystal Reports offers a wide variety of such drivers — unless your report draws data from two or more different data sources. In such a case, you can't use direct access; you have to talk to each data source in its own "language," and Crystal Reports doesn't support using multiple languages in a single report.

Crystal Reports has direct access drivers popular in PC database formats, including Microsoft Access, and the dBase/FoxPro/Clipper triad known collectively as xBase. In addition, it supports Microsoft DAO/OLE, Btrieve, ACT!, COM, Microsoft Exchange, and Microsoft Outlook. Crystal Reports has direct access drivers for the following client-server SQL databases: Microsoft SQL Server via Microsoft .NET, Sybase, and Informix. Other data sources too numerous to mention are also supported. If it holds data, is fairly widely used, and runs on a Windows box, Crystal Reports probably had a direct-access interface for it.

Connecting to ODBC data sources

In addition to using a direct access driver, you can connect to a database several other ways. One is ODBC (Open Database Connectivity).

ODBC is a standard method of connecting to a wide variety of data sources. It places a layer in the networking model between applications such as Crystal Reports and the databases they use; that layer is where ODBC-standard requests from the application are translated into the specific form required for each different data source. Practically all data sources in use today offer an ODBC interface, through which the ODBC driver connects to the database. All the application has to know is that it's communicating with an ODBC-compliant data source.

An ODBC database connection might not perform quite as well as a direct-access connection because the data has to pass through an extra layer of processing. This might or might not be a problem, depending on the implementation and the needs of the application. On the plus side, an application that communicates to its data sources through ODBC can pull data from multiple different data sources. It puts out its request in the same ODBC format, regardless of which data source it's talking to. Each such source has its own ODBC driver that translates the common ODBC commands into data source-specific commands that the data source can understand and obey.

Data sources for which Crystal Reports has a direct-access connection are also reachable through ODBC. For example, you can connect to Microsoft Access either through the direct connection or through ODBC. Direct connection might give you better performance but only if your report requires data *only* from Access. However, if you want to include data from both Access and a second data source, you must use ODBC for both Access and that second data source. Performance might be slower, but it beats not being able to connect at all.

Retrieving data with SQL

You can use Crystal Reports to create SQL queries of ODBC data sources. The query runs on a server and returns a result set to your computer. Offloading some query processing frees your computer to concentrate on other tasks, possibly improving overall performance. A second advantage is that you can use the full power of SQL to retrieve exactly the data you want.

TECHNICAL STUFF

SQL is the international standard language for communicating with databases. It differs from most common computer languages in that it's *nonprocedural:* That is, it deals with data one set at a time rather than one record at a time. Database developers use SQL. If you're a database user (rather than a developer), Crystal Reports might provide you with everything you need to get what you want from your databases.

Again, though, TANSTAAFL. You must be fluent in SQL to use the SQL Expression Editor in the Formula Workshop. I cover the use of Formula Workshop in Chapter 10. Gaining fluency in SQL requires some effort, but might be well worth the time. Start by reading *SQL For Dummies,* 6th Edition, or *SQL All-in-One Desk Reference For Dummies* (by yours truly, both published by Wiley). The first book gives you a painless introduction to SQL and a thorough description of all major features of the language. The second book covers more topics and goes into greater depth.

WARNING!

When you run a Crystal SQL query, it returns a snapshot of the data at the time the query was run. If the data in the database is updated later, you have to rerun the query to capture the changes.

Reporting on data in OLE DB data sources

OLE DB is a connectivity methodology similar to ODBC. (No surprise here, seeing as how Microsoft developed both.) OLE DB adds some flexibility in the types of data sources that it can communicate with, such as multidimensional OLAP sources and Web servers. ODBC communicates with relational databases that use SQL; OLE DB covers the rest, addressing data sources that don't use SQL (although it works well with relational databases, too). Crystal Reports supports OLE DB data sources, which are *OLE DB providers*.

Which interface should you use?

Deciding which interface to use depends on you and your needs. (You knew I was going to say that, didn't you?) You can draw a few conclusions from the information in this chapter; here are some guidelines for openers:

- ✔ **If your report draws data from only one source and there's a direct-access driver for that source,** using that driver is probably your best bet for good performance.
- ✔ **If your report draws data from two or more different sources,** direct access is not an option.
- ✔ **If you're drawing data from multiple relational databases,** ODBC is designed to give you what you need.
- ✔ **If one (or more) of your multiple data sources is not compatible with ODBC but all your data sources support an OLE DB interface,** OLE DB should be your connectivity choice.

Here are two other more-specific pieces of advice:

- ✔ **SQL programmers** can use Crystal Reports when they want to do a complex retrieval, and the connection between client and server has only limited bandwidth.

    The result set returned by an SQL query is a snapshot — it shows the state of the data sources *at the instant the query was run*. It does not necessarily reflect the current state of the data.

- ✔ **IT managers** can keep their users out of trouble, protect sensitive data, and make the data sources easier to understand by building dictionaries that give users what they need in an understandable form but don't expose parts of the data sources that aren't relevant to the users' jobs. Such dictionaries are transparent to report developers such as you. They are primarily to protect sensitive data. If your organization uses such dictionaries, you probably won't even know it.

Now that you know how to get Crystal Reports started, and how to connect to a data source, it's time for the main event, actually retrieving from the data source the information that you want. Chapter 5 tells you how.

Part II

Moving Up to Professional-Quality Reports

The 5th Wave   By Rich Tennant

"I'm not sure — I like the mutual funds with rotating dollar signs, although the dancing stocks and bonds look good too."

In this part . . .

*A*fter you know how to create a report based on database data, it's time to move up to the next level. In the chapters in this part, you discover how to tease the exact data you want out of the database, unobscured by the irrelevant data that surrounds it. You find out how to arrange data in the report to maximize reader comprehension. You start to master the art of formatting a report to draw the reader's attention to the most important information. Finally, you preserve the valuable features that you worked so hard on so that you can reuse them again and again in reports that you're called on to produce in the coming weeks, months, and years.

Chapter 5

Pulling Specific Data
from a Database

*I*f all your reports had to do was display all the data in your data sources, report creation would be easy. Organizations wouldn't need people as smart and well educated as you to design their reports. Luckily, for the job security of folks like you and me, report creation isn't that simple. Most reports with value gain that value by extracting specific information from the mass of data in the database — and *only* that information. This usually requires filtering out unwanted records, leaving behind irrelevant fields, combining data, and presenting data in a meaningful way. Database report designers are clearly valuable to any organization that depends on timely access to the information buried in its databases. With that in mind, this chapter introduces you to some of the most useful data-retrieval tools in Crystal Reports.

Get Data Quickly with Select Expert

Select Expert is an interactive tool for defining which data items to extract from a database and display in a report. Probably the best way to describe Select Expert is to give examples that show it in action.

Suppose that Albert Hellstern, the business manager of Xtreme Mountain Bikes (the sample business used throughout this book), wants to know the current inventory status and how it compares with the minimum inventory levels that the company likes to maintain for all its products. He will want to make sure that any inventory items that are below their reorder point are ordered right away. A query into the relevant tables via Select Expert retrieves the needed

information, and you can use the Standard Report Creation Wizard to format it into a report. Great! This sounds like just what Albert needs, but a lot of preliminary work must be done before Select Expert can be employed.

Follow along to generate this report:

1. **Choose File⇨New.**

   A submenu appears and gives you several options.

2. **Choose Standard Report.**

   The Standard Report Creation Wizard appears.

   You can read about this wizard in Chapter 4.

3. **Find and connect to the `xtreme.mdb` database.**

   This sample database might already be connected. If not, connect to it as described in Chapter 2.

4. **Add the tables needed to determine the inventory status.**

   For this example, select the Product, Product Type, and Purchases tables. Be sure not to select the Purchase table by mistake. When you're working on databases created by people other than yourself, always be on the lookout for table names that are similar, but not identical. In this case, the Purchase table and the Purchases table are entirely different.

5. **Click Next.**

   Link view of Standard Report Creation Wizard appears, as shown in Figure 5-1. You can see the links that Crystal Reports has inferred to exist between the selected tables.

   In this case, the inferred links are correct, so you don't need to adjust them. To read about how to adjust an incorrect link, see Chapter 4.

   The icons to the left of some fields indicate that those fields are indexed, which is a technique that increases the speed of retrievals. You can read more about indexing later in this chapter.

6. **Click Next to move to Fields view.**

   The tree in the Available Fields pane displays the fields that are available in the tables you chose.

7. **Select the fields that you want in the report, and then click the > button to transfer them to the Fields to Display pane.**

   Figure 5-2 shows how the screen looks after the selection. For this running example, choose the following:

   • *Product table:* Select Product ID, Product Name, Color, Size, and M/F.

   • *Product_Type table:* Select Product Type Name.

   • *Purchases table:* Select Reorder Level, Units in Stock, and Units on.

Figure 5-1:
Selected
tables
and their
relation-
ships.

Figure 5-2:
The
selected
fields.

8. **Click Next to move to Grouping view, and then click Next again to move to Record Selection view.**

   Albert is primarily concerned with how the Reorder Level field in the Purchases table compares with the Units in Stock and Units on Order fields in that same table. Grouping is not needed for this simple task. I discuss grouping in Chapter 6.

9. **From the tree in the Available Fields pane on the left, select the Reorder Level field, the Units on Order field, and the Units in Stock field and add them to the Filter Fields pane on the right.**

The screen looks like Figure 5-3. Notice that when you add a field to the Filter Fields pane, a pull-down list appears below the pane. The list displays a number of comparison operators that allow you to compare the contents of the selected field to values that appear in that field in the table in the database. This feature, by itself, does not give Albert what he wants. Instead, he wants to compare the In Stock status of each product against the specific Reorder Level for that product, not against some fixed number. By continuing, Albert can arrive at the solution he wants.

Figure 5-3:
The filter
fields.

10. **For this example, leave the default choice of *is any value* in place.**

11. **Click Next to display Template view.**

    Several templates are available. Many of the templates are fancy or colorful, but Albert doesn't care about being fancy.

12. **Choose the No Template option and then click Finish.**

    The report is displayed in the Preview tab, as shown in Figure 5-4.

The report shows the information you expect, but the formatting could be improved. Some columns, such as Color and Product Type Name, are wider than necessary to fully display the data they contain. Other columns are too narrow to fully display their headings. Switch to the Design tab and make manual adjustments to these layout features. I showed you in Chapter 2 how to adjust the column widths and change the column headings to a bold font that was not underlined. You can do the same thing here. In addition, you may want to resize the text boxes holding the column headings to accommodate two lines of text as shown in Figure 5-5.

Figure 5-4: Inventory-level report, created by Standard Report Creation Wizard.

Figure 5-5: Reformatted inventory-level report.

This report looks pretty good, displaying all the products and showing their inventory levels compared with their reorder levels. However, the report doesn't emphasize the products in critically short supply. What Albert would really like to see is a report that lists only those products with inventory at or below reorder level. To get that, you have to go beyond what a straight-forward use of Crystal Reports can provide.

Suppose an emergency crops up before you can figure out how to get the report that Albert wants. A worker comes in from the warehouse and tells him that some of the helmets are in short supply. Keeping a full line of helmets in stock is difficult because they come in several different sizes and colors. Albert knows that the reorder level for helmets is 100 units, so he asks you to modify the report you have just created to show only items where fewer than 100 units are in stock.

Your job now is to quickly give Albert the information he needs, and this is where Select Expert comes in:

1. **With the inventory report open, choose Report⇨Select Expert.**

   A submenu appears with several options.

2. **Choose Record.**

   The Choose Field dialog box appears.

3. **In the Purchases table, select Purchases.Units in Stock and then click OK.**

   You can select the field from within the Report Fields category or from the actual table.

   Select Expert appears, with a pull-down list that you can use to specify a condition for the Purchases.Units in Stock field, as shown in Figure 5-6.

Figure 5-6:
Selecting
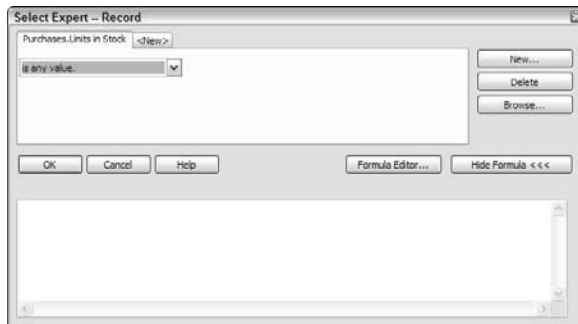the Units in
Stock field.

4. **Choose *is less than or equal to* and enter** 100 **in the comparison field, as shown in Figure 5-7. Then click OK.**

   For this example, remember that Albert wants to know when 100 or fewer helmets remain in inventory.

   A dialog box appears, asking whether you want to use data that was saved earlier or to refresh the data by querying the database again.
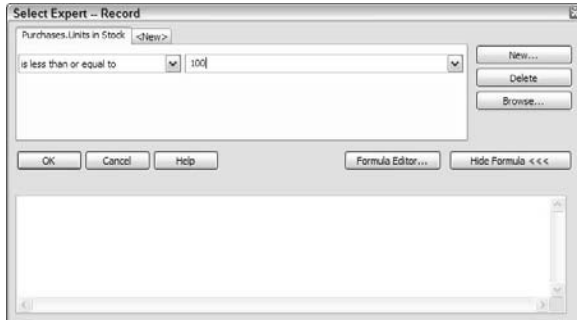
Figure 5-7:
Select a
condition.

TIP

This question has major performance implications. For a large database with many records, refreshing the data could take a significant amount of time. On the other hand, saved data is available instantly. If you have reason to believe that the database has not changed since it was saved, you can speed up your task by using saved data. In Albert's case, that's not a good idea because someone might have just bought a *lot* of helmets.

5. **Click the Refresh Data button.**

Albert wants to know what the inventory status is right now. Figure 5-8 shows the report that appears.

Figure 5-8:
The inventory report shows only products with an in-stock quantity of 100 or fewer.

The report shows all products with in-stock quantities of 100 or fewer. This includes some helmets, some locks, and some saddles. As you can see, all listed helmets are below their reor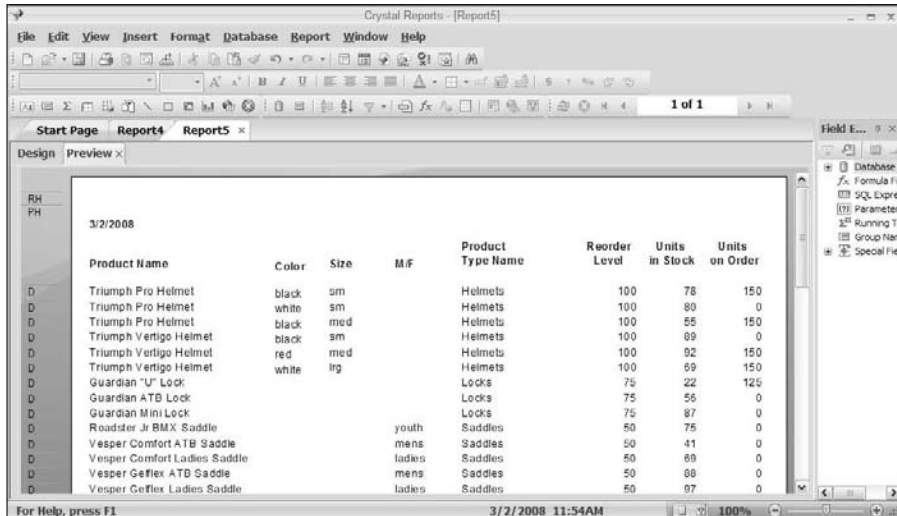der quantities. However, orders have already been placed for all but two of them. The small, white, Triumph Pro helmet and the small, black, Triumph Vertigo helmet should be ordered immediately. Some of the locks and saddles are below their reorder quantities and some are above, because locks and saddles have lower reorder quantities than helmets. Albert can quickly tell from this report which helmets he needs to order. However, the report would be better if it weren't cluttered with data about locks and saddles (not his present concerns). To have that level of specificity, you have to use a formula.

TIP

When your comparison is on a numeric field (such as Units in Stock), the available comparison operators (such as *is less than or equal to*) are appropriate for making numeric comparisons. Likewise, for date type data, comparison operators appropriate for dates are available. The types of comparisons you can do depend on the type of data you're looking at.

Using Formulas to Retrieve Data

In Chapter 10, I give formulas extensive coverage. For now, you'll see how you can use formulas to help Albert. Suppose he decides that it is helpful to know about products other than helmets that are also below their reorder levels — but without having to wade through rows of products that are not below their reorder levels. You can help.

The current selection criterion specifies that Units in Stock be less than or equal to 100. However, you can replace it with a new, more complex selection criterion: namely, that Units in Stock be less than or equal to Reorder Level. In the original selection, you're comparing against a fixed quantity (100). In the new selection, you're comparing against a quantity that varies, depending on the type of product you're examining.

These steps get you there:

1. **Choose Report⇨Selection Formulas⇨Record.**

   The Formula Workshop Record Selection Formula Editor window appears, as shown in Figure 5-9. It displays the formula that governs the current selection that resulted in the report shown in Figure 5-8. The formula is

   ```
   {Purchases.Units in Stock} <= 100
   ```

   This is the formula that Select Expert creates in response to the choices you made.

Figure 5-9:
Record
Selection
Formula
Editor,
showing
original
selection
formula.
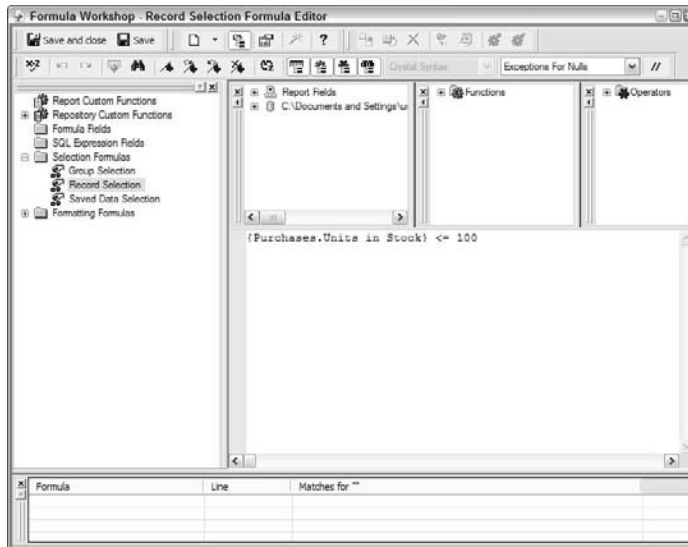
But now you're creating a new formula, replacing the 100 to the right of the <= sign with {Purchases.Reorder Level}, and adding a plus sign (+) and {Purchases. Units on Order} to the left of the <= sign. If an item is below its Reorder Level, but an order for more has already been made, you probably don't want to order it again.

2. To create this new formula, select the 100 and delete it, and then double-click Purchases.Reorder Level in the Report Fields tree (the tree in the upper-left corner of the Record Selection Formula Editor window).

3. To the left side of the formula, type a plus sign and then {Purchases. Units on Order} by typing it or by double-clicking like you did with {Purchases.Reorder Level}.

Figure 5-10 shows the result. Now, the new selection criterion restricts retrieval to items that have a stock level plus items on order that is less than the reorder level.

4. Click the Save and Close button in the upper-left corner of the Record Selection Formula Editor.

Formula Workshop disappears.

5. When asked whether you want to refresh the data or use saved data, choose Refresh Data.

The modified report appears, as shown in Figure 5-11. This report displays inventory items where the quantity in stock is less than or equal to (and on order) the reorder level for that item. This gives Albert a good idea of what to order.
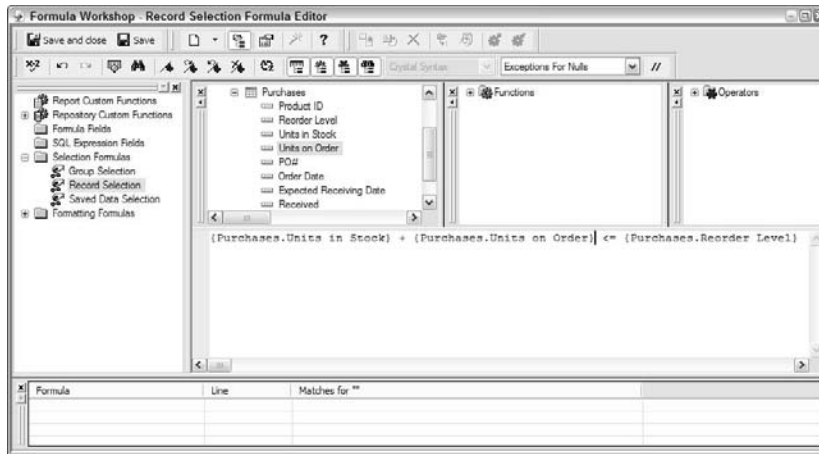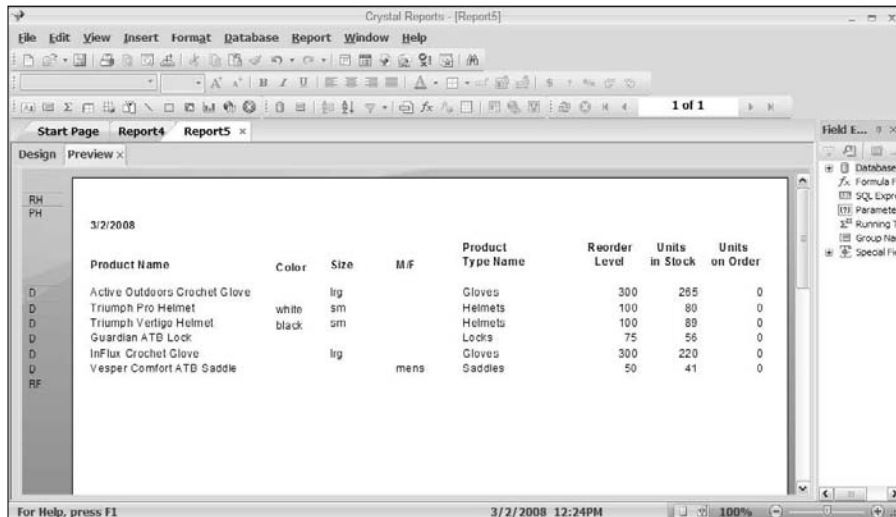
Using Parameter Fields to Retrieve Data at Runtime

To show one of the many things that you can do with parameter fields, sup-
pose that Xtreme's Vice President of Sales, Andrew Fuller, wants a report that
he can run from time to time to show him major purchases and who made
them. To help focus the company's sales efforts, he wants to identify cus-
tomers who have placed large orders — and to specify what constitutes a
"large" order at the time he runs the report.

The first step is to create a report that lists customers and the orders they made. The next step is to place a condition on the report that restricts the rows displayed to orders with a higher dollar value than the value Andrew enters at runtime. A fixed value or a value from a database table field won't do the job. The report requires a *parameter field*.

Step 1: Creating a report that shows everything

To create the first version of the report that Andrew needs (what I call the Big Orders report), follow these steps:

1. **Choose File⇨New.**

2. **From the submenu that appears, choose Standard Report.**

3. **When Standard Report Creation Wizard appears, make sure that the `xtreme.mdb` database is connected.**

   For more information on how to connect to this database, see Chapters 2 and 3.

4. **Transfer Customer and Orders to the Selected Tables pane, using the drag-and-drop technique.**

5. **Click Next.**

   Link view displays a graphical representation of the tables and the links between them, as shown in Figure 5-12.

Figure 5-12: Tables needed for the Big Orders report.

6. **Click Next to display Fields view.**

7. **Select the following fields to display on the report in the Available Fields pane and click the > button to move them to the Fields to Display pane:**

   • *Customers table:* Select Customer ID, Customer Name, Contact First Name, Contact Last Name, and Phone.

   • *Orders table:* Select Order Amount.

   Figure 5-13 shows Fields view after you make these selections.

Figure 5-13: Fields needed for the Big Orders report.

8. **Migrate to Template view by clicking Next three times.**

   No need to do anything with the Grouping or the Record Selection views at this time.

9. **In Template view, keep the No Template option, and then click Finish.**

   The report looks like Figure 5-14.

The spacing of the columns isn't the greatest, but you can adjust them manually and do some other formatting. With a bit of tweaking, you can get something like the report shown in Figure 5-15.

Figure 5-14:
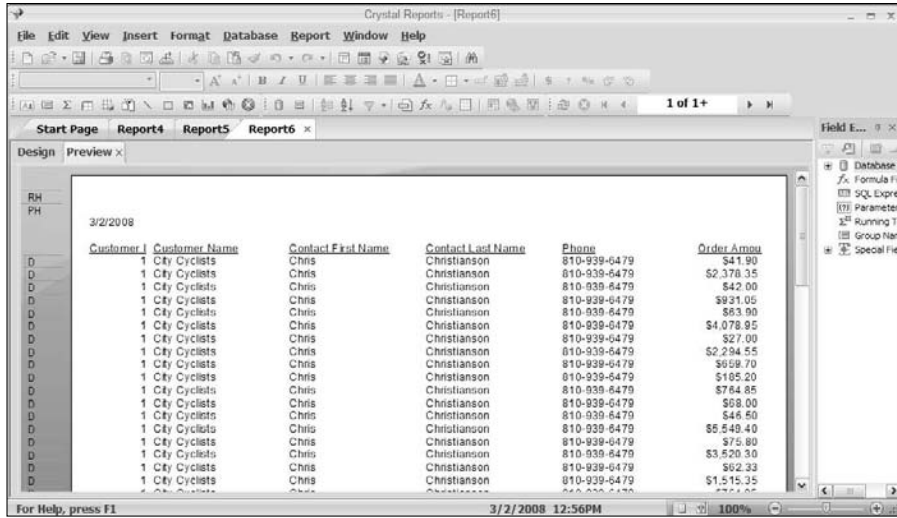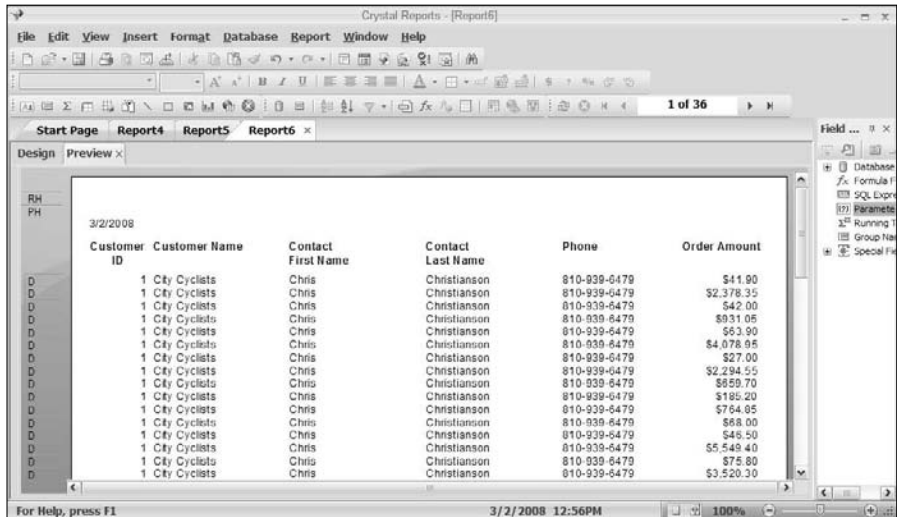First version of the Big Orders report.

Figure 5-15:
Refined version of the Big Orders report.

The report has almost 2,200 records. Each record represents a single order by one of Xtreme's customers. The next step is to pare down those records to just the ones Andrew wants to see.

Step 2: Giving the user the power to decide what to show

To get there, create a parameter field so Andrew can enter a dollar amount as the minimum value for those records:

1. **If you can't see Field Explorer on the right edge of the screen, choose View⇨Field Explorer.**

   Field Explorer appears.

2. **In the Field Explorer tree, right-click the Parameter Fields option and then choose the New option.**

   The Create New Parameter dialog box appears.

3. **Enter a name for the parameter field, some prompting text to tell the user what to enter, and the data type of the entry the user is to make.**

   For the example, you can name the parameter field *Lower Limit* and choose the Currency data type from the Type pull-down list. In the Value Options pane, for Prompt Text, make the Setting *Enter lower limit for a big order:*. Figure 5-16 shows the Create New Parameter dialog box after you make these entries. Leave the other options at their default values.

4. **Click OK.**

Figure 5-16: Create New Parameter dialog box, specifying the lower limit parameter field.
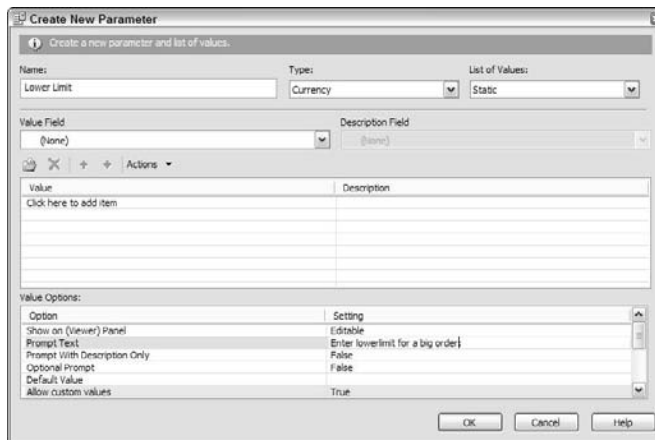
The parameter field is ready to add to the Big Orders report as the selection criterion, specifying which records to retrieve from the two-or-so-thousand in the Orders table. Select Expert is the tool for this job; here's how to put it to work:

1. **Click the Select Expert icon on the Expert Tools toolbar.**

   The Choose Field dialog box appears.

2. **Select the field you want to compare against and then click OK.**

   For this example, select the Order Amount field in the Orders table and click OK.

   Crystal Reports displays the Select Expert – Record dialog box, with the Orders.Order Amount tab selected.

3. **From the pull-down list, select *is greater than or equal to.***

   A data entry field with a pull-down control appears to the right of the list.

4. **Pull down the list and select {?Lower Limit}.**

   Crystal Reports denotes a parameter field by enclosing it in curly braces and preceding the parameter field's name with a question mark.

5. **Click OK.**

   The Enter Values dialog box appears.

6. **Enter** 5000 **as an initial value, and then click OK.**

   You're using the number 5000 to indicate a sale of at least $5,000.

   The by-now familiar Change in Record Selection Formula dialog box appears, asking whether you want to use saved data or refreshed data.

7. **If there's any possibility that the data has changed since the last time it was saved, choose Refresh Data.**

   Figure 5-17 shows the result. The report looks much as it did in Figure 5-16, with only a few hundred records (instead of thousands) appearing, and every one showing an Order Amount of at least $5,000.

Figure 5-17: Ooh! Big spenders!

8. **Save this report with the name `Big Orders.rpt`.**

Andrew can now see at a glance which customers make a large number of orders valued at over $5,000 as well as which ones occasionally make orders that large. He can now formulate sales promotions targeted at these customers. (Now imagine Andrew thanking you, and your modest reply: "Hey! No problem, Andrew!")

Speed retrievals with indexes

Those icons in Figure 5-12 that look like overturned Monopoly houses indicate which fields in the tables are associated with indexes. Records in a database table are generally not arranged in any useful order. Usually, they're still in the order in which they were first entered into the table.

To make a selective retrieval (such as Andrew's, which finds all orders over $5,000), every single record must be examined — that is, unless you sort 'em beforehand. If you sort those records by Order Amount in descending order, only the records that equal or exceed $5,000 have to be checked. This could save some serious retrieval time, especially for a large table in which relatively few orders had values of more than $5,000.

Not surprisingly, a lot of overhead is associated with maintaining a data table in sorted order. In addition, sorting it on one field also *unsorts* it on any other field that you might want to use as a retrieval key. The answer is to create indexes for the fields that you'll use as *retrieval keys.* The icons in Figure 5-12 show which fields are indexed. As you can see, Order Amount is not one of them. If the Orders table grows to hundreds of thousands of rows, and if people are going to be making frequent retrievals based on Order Amount, Andrew might want to ask Xtreme's database administrator to create an index field for Order Amount in the Orders table of the company's database.

Changing parameter values to change the report

Suppose that now, after seeing the hundreds of entries in the report in Figure 5-17, Andrew wants to see a list containing only the customers who have made *really* big orders — those that exceed $9,000. All you have to do is rerun the report and then follow these steps:

1. **Click the Refresh icon on the Navigation Tools toolbar to rerun the report.**

It looks like two arrows chasing each other around in a circle.

The Refresh Report Data dialog box appears, asking whether you want to use the current parameter values or prompt for new parameter values.

2. **Choose the Prompt for New Parameter Values option, and then click OK.**

   The Enter Parameter Values dialog box appears.

3. **Enter** 9000 **in the text box below the prompt phrase, and then click OK.**

   Now the report contains only 43 records. Only orders of at least $9,000 are included in this version of the Big Orders report.

You can rerun the report as many times as you want, changing the Lower Limit parameter each time, to get a precise idea of which customers make large buys, regardless of how you want to define a large buy. (Gotcha covered, Andrew.)

Troubleshooting Tips When Retrieving Data

Three basic problems might arise when you try to retrieve specific data from a database:

- ✔ You don't retrieve all the data you want.
- ✔ You retrieve data you don't want.
- ✔ You retrieve all the data you want and none of the data you don't want, but the retrieval takes an unacceptably long time.

The first two problems sometimes have an easy explanation:

- ✔ **Failing to specify all the tables you need:** Some tables might not contain a single field you want to display, but they're needed anyway to provide a link between the tables that *do* contain fields you want displayed.

- ✔ **Failing to specify all the fields you need from the tables you select:** Make sure you understand exactly how the tables relate to each other — and to the information you're asking for. If what you need depends on multiple fields in multiple tables, be sure to select all those fields.

- ✔ **Specifying your selection condition incorrectly with Select Expert:** You must choose from a number of comparison operators, and you must then apply the operator to the correct constant value, field value, or parameter value. You can verify that you're comparing against the correct constant value or field value when you create the report. However, if the user enters an incorrect parameter value at runtime, it could cause incorrect results that might slip by undetected.

Slow retrievals are another matter; they can cause problems when you have to deal with large data sets. Often a careful analysis — followed by indexing the fields that serve as retrieval criteria — can speed up retrieval time tremendously. This is a job for the database administrator, however, not the report designer.

Chapter 6

Sorting, Grouping, and Totaling Report Data

*T*he primary goal when creating a report is to put database data into a meaningful and easily understandable form. To achieve this goal, you must extract only the data you want, from the specific rows and columns of the relevant tables. However, if you don't present the information in the report in a logical manner, meaning and understanding can suffer.

You can greatly enhance the value of a report by arranging the retrieved data in a way that clearly conveys what that data means and emphasizes its important features. Sort the records, and group related records in such a way that the significant information is emphasized. Crystal Reports has powerful tools to help you sort report data in a variety of ways, group related data, and summarize data within groups.

Sorting Report Data

In most cases, the original order of the data in a database is not the most helpful order, so you need to reorder the data for your purposes. The *sort function* in Crystal Reports does this for you.

The way in which data is sorted depends on how you specify the sort as well as on the type of data that you want to sort. You can sort data in ascending order or descending order. In general, *ascending* means lowest to highest, and *descending* means highest to lowest. What ascending and descending mean for any given sort, however, depends on the type of data you're sorting.

The data types you might want to sort include the following:

- ✔ Single-character string fields
- ✔ Multiple-character string fields
- ✔ Currency fields
- ✔ Number fields
- ✔ Date fields
- ✔ Date-time fields
- ✔ Time fields
- ✔ Boolean fields

Assuming an ascending sort order, Table 6-1 shows how data types will be sorted. For descending order, just reverse the sequence.

Table 6-1	Ascending Sort Order for Various Data Types
Field Type	**Sort Order**
Single-character string field	Blank Punctuation mark Numeral Uppercase letter Lowercase letter
Multiple-character string field	First character, then second, then third, and so on; for example, *mm* comes before *mmm*, and ALLEN comes before Abe
Currency field	Numeric order
Number field	Numeric order
Date field	Chronological order
Date-time field	Chronological order, first by date and then by time
Time field	Chronological order
Boolean field	False, and then true

TIP

If a sort is based on a field that contains null values, the null values are sorted before non-null values. A field is said to have a *null value* when it has nothing in it. In contrast, zero is not a null value. Its representation in a computer memory is 30 in the hexadecimal number system. A blank space also has a definite value, hex 20. However a null value *really* means nothing. It is represented by a hex 00. Zeros and blank characters at least have an existence, but null values do not.

Sorting based on multiple fields

When you sort data items based on the value of one field, the outcome is straightforward. If the sort is ascending, it proceeds according to the rules in Table 6-1. If the sort is descending, the sorted order is the reverse of an ascending sort. Sometimes, however, you want to sort data based on the contents of more than one field.

Consider, for example, the Customer table in the Xtreme database. (Xtreme is the name of the fictitious company in the sample database examples used in this book. You can read about the database and how to find it in Chapter 2.) Xtreme's Sales Manager wants a list of customers sorted first by country, then by region within a country, and finally by customer name within a region. Crystal Reports can perform such a *nested sort*. In fact, it can do so for as many levels of nesting as you want. To build such a report, follow these steps:

1. **From the Crystal Reports Start Page, select Report Wizard.**

2. **Add the Customer table from the `xtreme.mdb` database to the Selected Tables pane.**

3. **In the Standard Report Creation Wizard, click Next to display Fields view.**

4. **Add the Customer ID, Customer Name, Region, and Country fields to the Fields to Display pane.**

5. **Click Next three times to display Template view.**

   At this point, you don't want to group records or select specific records, so skip those views.

6. **Retain the No Template option, and then click Finish.**

   The report shown in Figure 6-1 appears.

At this point, the report has the data you want, but it's sorted by Customer ID because that's the first field you specified in Fields view. Furthermore, the columns are not centered, and the report needs a title. To correct these problems, do the following.
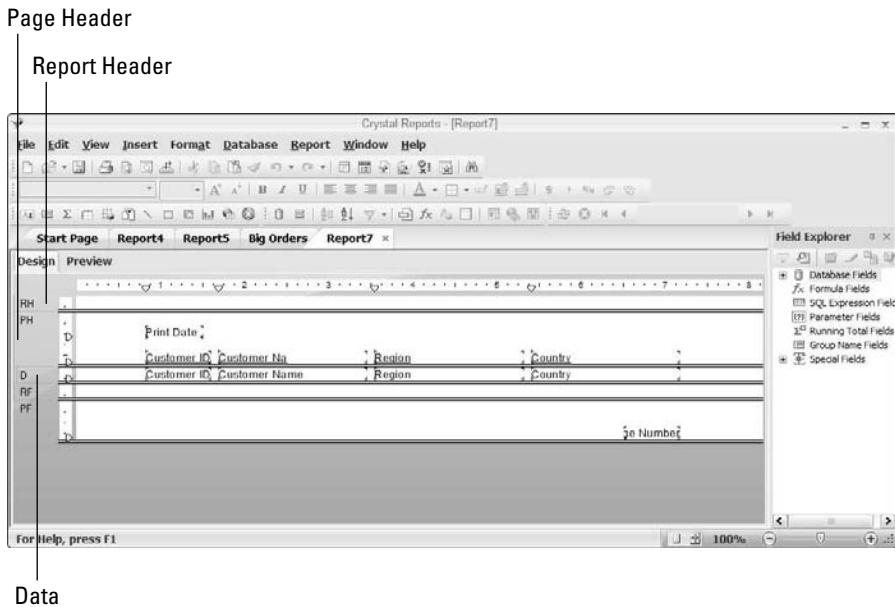
Figure 6-1: The first draft of the Customer report, sorted by Customer ID.
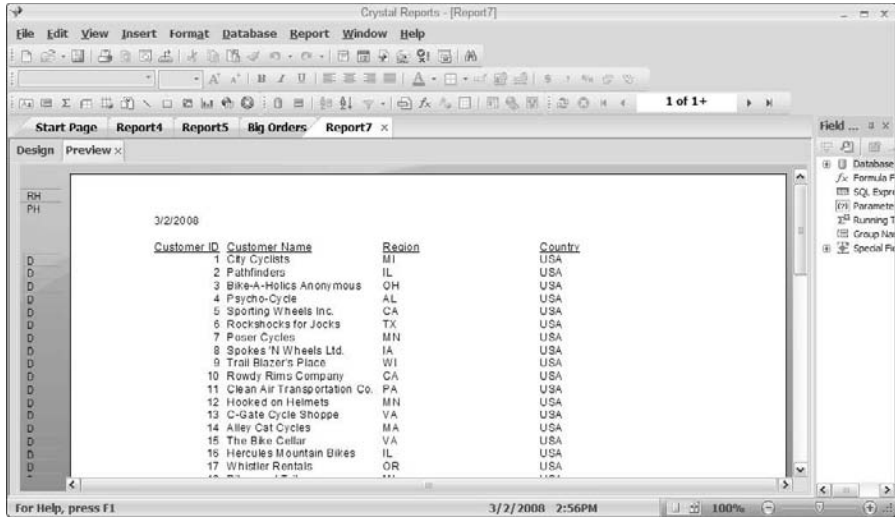
1. **Switch to Design view by clicking the Design tab.**

   The report appears like that shown in Figure 6-2.

Page Header

Report Header

Figure 6-2: Design view of the first draft of the Customer report.

Data

2. **Change the justification of all fields to** *center* **by clicking the Align Center icon when each field is selected, both in the Page Header and in the Data section.**

   This balances the appearance of the report.

3. **Pull down the border between the Report Header section and the Page Header section to make room for the report title in the Report Header.**

4. **Click the Insert Text Object icon on the Insert Tools toolbar, and drop it into the Report Header.**

5. **In the text box, type** Customer List, Sorted by Country and Region**.**

   This is the report title.

6. **Expand the text box to the left and right so that it spans the entire width of the report. Expand it vertically as well so that it can accommodate a large font.**

7. **Center the report title in the text box, make it bold, and increase its font size by clicking the Increase Font Size icon on the Formatting toolbar.**

   Figure 6-3 shows what Design view looks like after you make these modifications.

This design produces the report preview shown in Figure 6-4.

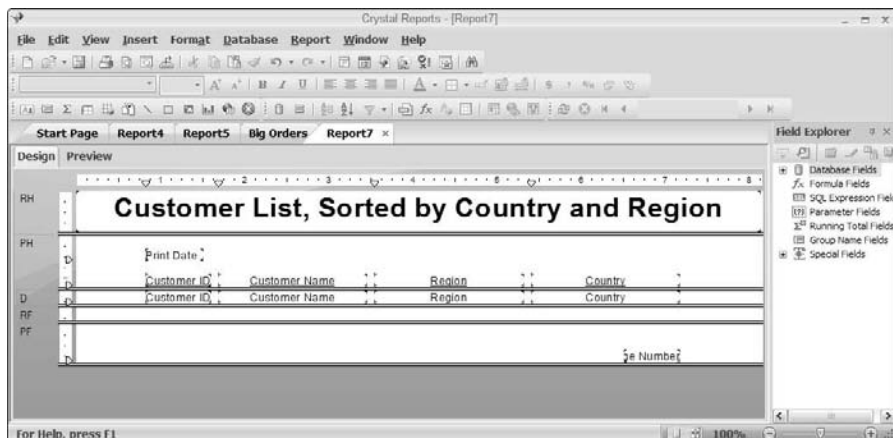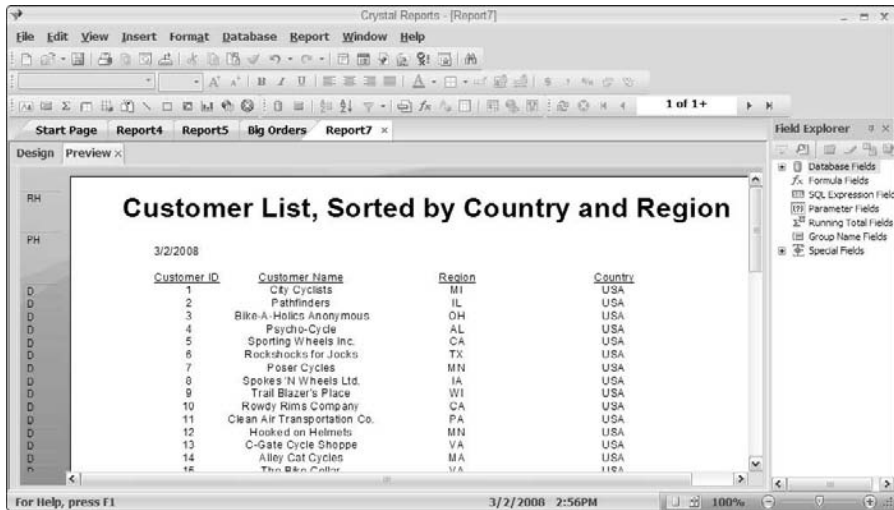**Figure 6-3:** Design view of the modified Customer report, still sorted by customer ID.

The report looks nice, but it's not sorted by country and region. To remedy that problem, follow these steps:

1. **Choose Report⇨Record Sort Expert.**

   The Record Sort Expert appears, as shown in Figure 6-5.

2. **In the Available Fields pane, select Customer.Country, and then click the > button. Do the same for Customer.Region and then for Customer.Customer Name.**

3. **Make sure that the Sort Direction is Ascending for all three fields, and then click OK.**

   The report's records are sorted first by country, then by region within a country, and finally by customer name within a region. Figure 6-6 shows the properly sorted report.
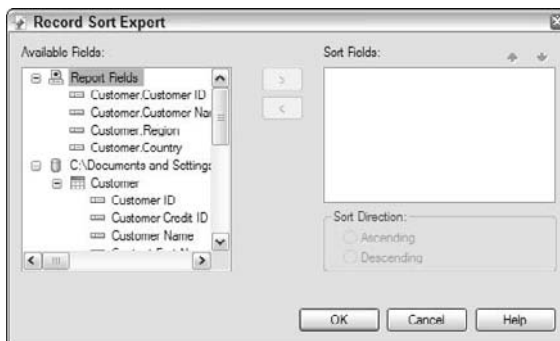
Figure 6-6:
The Customer report, sorted by country, region, and customer name.

Notice in the figure:

- **The first sort key is Country.** The first record is for a customer in Argentina, and the second is for a customer in Aruba.

- **The second sort key is Region.** Within Australia, New South Wales comes before Queensland, which precedes Tasmania and Victoria.

- **The third sort key is Customer Name.** Within Victoria, Bruce's Bikes comes before Kangaroo Trikes.

The report meets the objectives of the development effort in terms of both information content and ease of understanding.

Sorting and performance

How long it takes Crystal Reports to produce a report can depend, to a large measure, on the sorting that the report requires. For databases with tables consisting of many records, sort times often account for a major portion of the total time it takes to produce a report.

The sort time is affected by the fields on which you sort. In most cases, you can sort a large table on an indexed field orders of magnitude faster than you can sort the same table on a nonindexed field. The lesson here is to sort on indexed fields whenever possible. If you regularly run reports that include sorts on nonindexed fields, consider talking to your database administrator (DBA) about adding indexes to those fields. A performance penalty is associated with maintaining an index (because it can consume a significant

amount of time), but if you don't update the data table often and run reports frequently, the updating overhead might be insignificant compared with the ability to generate reports more quickly.

REMEMBER

It does *not* make sense to index a field in a table with few records, or a table with many records if the index field can take on only one of a small number of values. The cost of maintaining the index exceeds the benefit you would gain from it.

Adding Sort Controls to a Report

Different people have different needs, when it comes to reports. For the Customer List shown in Figure 6-6, a report reader might be very familiar with customer names and want to see the report sorted by customer name. For such a person, having a report that is sorted first by country, then by region, and finally by customer name might not be the best. Crystal Reports 2008 has a new feature that enables the end user to sort the report. This provides a customization ability that was absent in earlier versions of Crystal Reports. By placing sort controls on the report, the report developer can give the user the ability to change the order in which the records are sorted. To add sort controls to the Customer List, Sorted by Country and Region report, follow these steps:

1. **Right-click Customer Name in the Page Header section.**

   This surfaces the Field Heading menu.

2. **Click Bind Sort Control.**

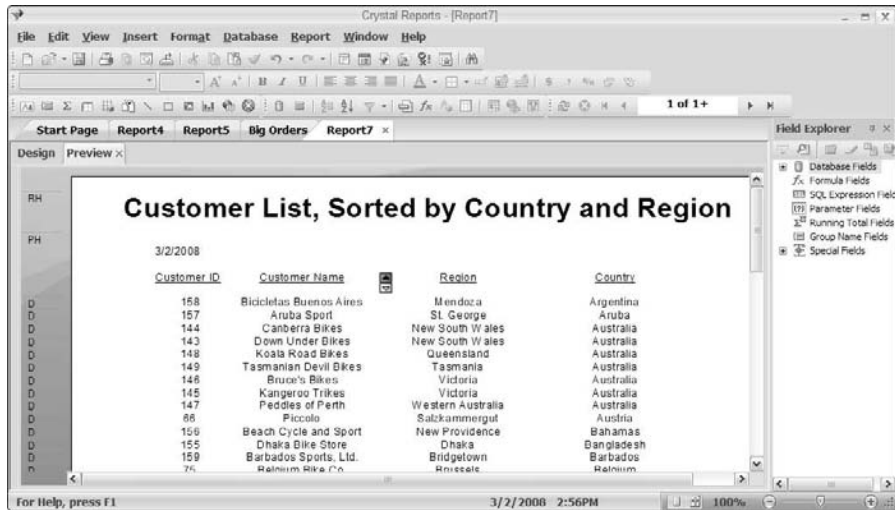   The Sort Control dialog box appears, as shown in Figure 6-7.

Figure 6-7:
The Sort Control dialog box shows fields for which sorts exist.

3. **Select A – Customer.Customer Name and then click OK.**

   A sort control with up and down arrows appears to the right of the Customer Name label in the Page Header, as shown in Figure 6-8.

Figure 6-8:
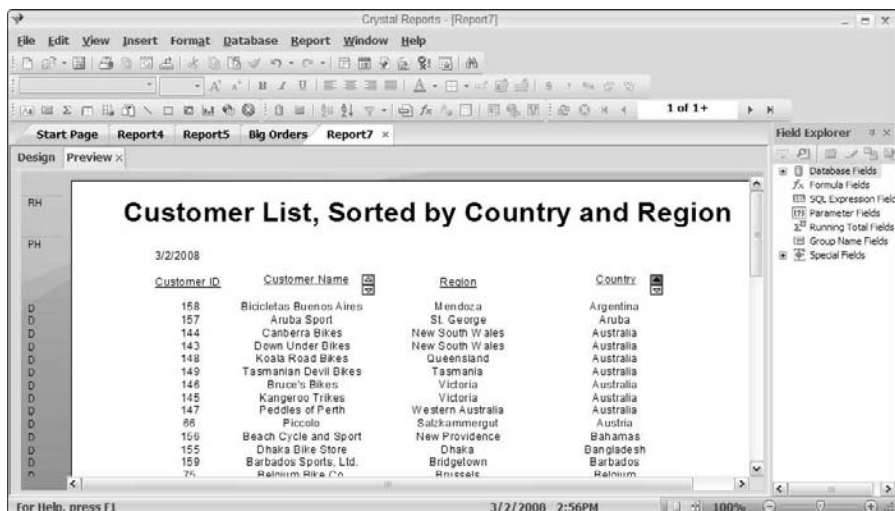Customer
Name now
has a sort
control.

Logically enough, when the user clicks the up arrow, the column below
the sort control is sorted in ascending order. Clicking the down arrow
causes a descending sort.

4. **Put a sort control on the Country column in the same manner that you
use for the Customer Name column. Shrink the horizontal dimensions
of the text boxes in the Page Header so that the sort controls are
located closer to the text they are bound to.**

Figure 6-9 shows the report after both sort controls have been added
and the associated text boxes have been shrunk.

Figure 6-9:
Sort
controls
have been
added, but
not yet
used.

Because the report is already sorted, first by country, next by region, and finally by customer name, all in ascending order (pshew!), see what happens when you sort by country in descending order.

5. **Click the down arrow to the right of the Country label in the Page Header.**

Figure 6-10 shows the result. The first record is from Zimbabwe, followed by the records of customers in Wales, Vietnam, Venezuela, and the USA.

Notice that within a country, Region is still sorted in ascending order. Alabama comes before Arkansas, which comes before Arizona. Also, within a region, Customer Name is still sorted in ascending order, too. Benny – The Spokes Person comes before Psycho-Cycle, which comes before The Great Bike Shop.

What happens when the Customer Name sort control is clicked for a descending sort?

6. **To perform a descending sort on Customer Name, click the down arrow to the right of the Customer Name label.**

Figure 6-11 shows what happens.

Running a descending sort on Customer Name brings the customer whose name is closest to the end of the alphabet to the top, regardless of country or region. Because each customer is in one and only one region, in one and only one country, sorting by customer name (ascending or descending) destroys any sorts on region or country that might exist. This is in contrast to the earlier descending sort on country. It left the ascending sorts by region and customer name intact.

Figure 6-10:
The report is now sorted by country in descending order.
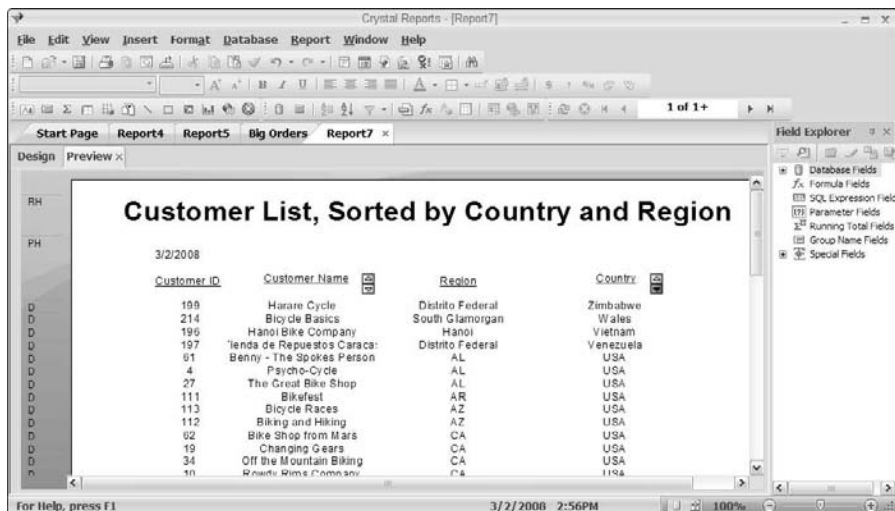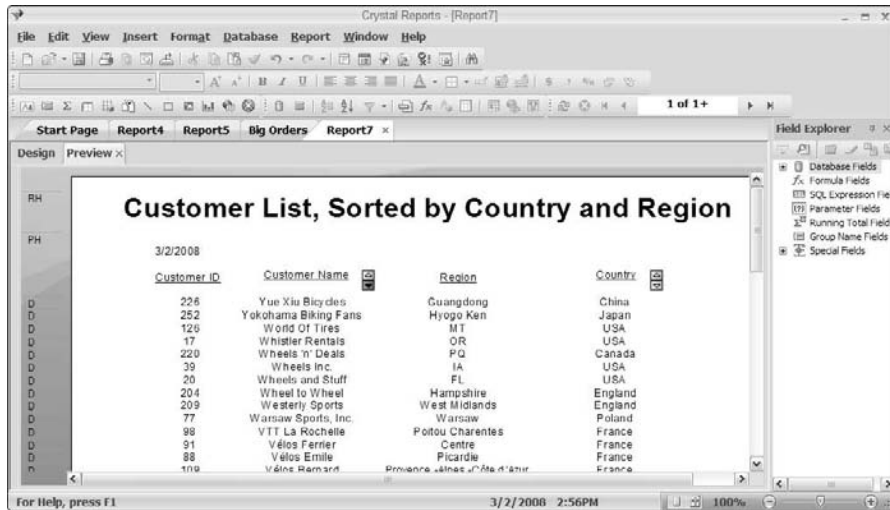
Figure 6-11: The most recent sort supersedes earlier sorts.

Grouping Related Items

A simple sort, such as the one in the preceding section, works fine when all you want to do is put a list of items in some order. Often, however, you want to do more with your data, such as displaying subtotals, counts, averages, or other summary information along with each group. Crystal Reports offers great flexibility in specifying groups as well as a wide variety of summarization facilities. These grouping and summarization capabilities are among the most advanced of any reporting tool. A group can be any collection of elements that have one or more attributes in common.

To demonstrate a small fraction of the power of Crystal Reports' grouping facilities, take another look at the Xtreme Mountain Bikes database. Suppose that the Vice President of Sales wants to get a better idea of where customer orders are coming from. Focusing on Mexico, he wants a report that shows order totals grouped by state and sorted by customer name within each state. Follow these steps to build that report:

1. **From the Crystal Reports Start Page, select the Report Wizard.**

2. **From the Available Data Sources pane, add the Customer and Orders tables to the Selected Tables pane.**

3. **Click Next.**

   The Link view appears.

4. **Click Next.**

   Fields view displays.

5. **Select the Customer Name and Region fields from the Customer table and the Order Amount field from the Orders table.**

6. **Click Next.**

   Grouping view appears.

7. **To meet the Vice President's needs, group by Region.**

   To do so, move Customer.Region to the Group By pane, as shown in Figure 6-12.

8. **The default sort order (in ascending order) is fine, so click Next.**

   Summaries view appears, as shown in Figure 6-13.

9. **Click Sum of Orders.Order Amount to select it.**

   A pull-down menu appears, with the default selection of Sum. Crystal Reports assumes that type of summarization you want to perform on the Order Amount field is summation. This is a good assumption.

   Even though the default summary type of Sum is the one you want for this report, several other options are available. Average gives you the average value for the group, Maximum displays the maximum value for the group, and Minimum displays the minimum value. Statistical functions and a simple count of the number of records in the group are available as well.

10. **Click Next three times.**

   You don't need to change anything on Group Sorting view, and you don't want a Chart, so skip these views.

Figure 6-12: The report is grouped by the customer's region.

Figure 6-13:
Summaries
page of the
Standard
Report
Creation
Wizard.

11. **In Record Selection view, include in the report the records for Mexico customers only.**

    In the Available Fields pane, select Country from the Customer table and add it to the Filter Fields pane. In the pull-down list below the Filter Fields pane, select Is Equal To; from the pull-down list that pops up below it, select Mexico.

12. **Click Next.**

    Template view appears.

13. **Retain the No Template option and then click Finish.**

    The report shown in Figure 6-14 appears.

As with most reports created by the Standard Report Creation Wizard, this one could use some tuning. Here are some problems you might want to fix:

✔ The customer region names appear too often.

✔ The region summaries should be located under the Order Amount column.

✔ The report could use a bold, centered title.

Switch to the Design tab and make the adjustments that will correct these problems. After you make the adjustments, Design view appears (as shown in Figure 6-15), and the Preview tab view appears (as shown in Figure 6-16).

Figure 6-14: The Customer report, grouped by region.

Figure 6-15: Design view of the reformatted Customer report.

The Vice President of Sales can now easily see which states in Mexico are producing orders and which customers in those states are placing orders. Thanks to the group subtotals and a Grand Total at the bottom of the report, he can also see the total value of orders in each state and in the entire country.

Save the report as Customer Report Grouped by Region (Mexico). Every time you run the report, it will show the updated results based on the current database contents.

Calculating Percentages

Suppose that Xtreme's Vice President of Sales feels it would be more instructive to know the percentage rather than the dollar value of Mexico's order total coming from each state. Simply modify the existing report to include percentage summary fields rather than the sum field:

1. **In Design view, right-click the Sum of Orders.Order Amount field in the GF1 band and choose Edit Summary from the contextual menu that appears.**

   The Edit Summary dialog box appears, as shown in Figure 6-17.

Figure 6-17:
The Edit
Summary
dialog box,
showing the
Orders.
Order
Amount
field.
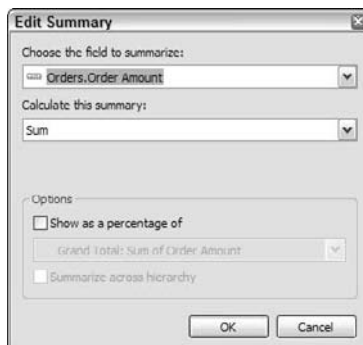
2. **Select the Show as a Percentage Of check box.**

   This activates the drop-down list that shows the default choice, Grand Total: Sum of Order Amount.

3. **Click OK to display the group totals as percentages of the Grand Total.**

   The Design view of your report appears to be unchanged.

4. **Switch to the Preview tab.**

   The report looks like Figure 6-18.

This report makes it immediately obvious that more than half of Mexico's orders are coming from Distrito Federal. This information might cause the company to change its marketing strategy to encourage orders in other parts of the country.

Figure 6-18: The Customer report showing state totals as a percentage of the country total (Mexico).

Drilling Down for Detail

In the report prepared for Xtreme's Vice President of Sales (in the preceding section), you can easily see where most sales are coming from because the company doesn't have many customers in Mexico. The same report would not be as informative if it were run for the United States, where many more customers are located. The first page of the same report for the United States looks like Figure 6-19.

Figure 6-19:
A Customer report showing state totals as a percentage of country total (USA).
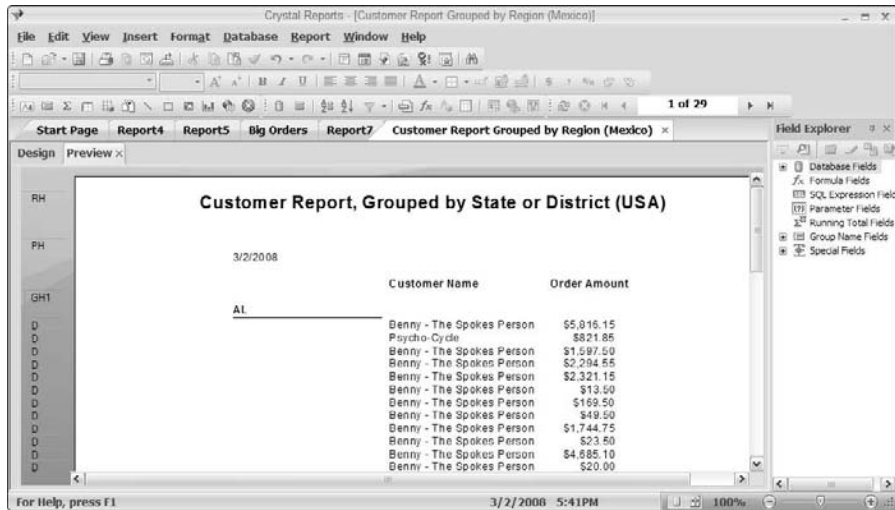
To change the Mexico report to a report on USA orders, follow these steps:

1. **Choose Report⇨Select Expert.**

   The Select Expert dialog box appears.

2. **From the submenu that appears, select Record.**

   The Select Expert – Record dialog box appears.

3. **Select Customer.Country** *is equal to* **USA in place of the existing Customer.Country** *is equal to* **Mexico.**

4. **Click OK; then, when prompted, click Refresh Data.**

5. **Edit the text in the report header to read** `Customer Orders, Grouped by State or District (USA)`.

6. **(Optional) If you have to reduce the font size of the report header to fit everything on one line, click repeatedly on the Decrease Font Size icon on the Formatting toolbar.**

7. **Save this report as Customer Orders Grouped by State or District (USA).**

This report is not very helpful. You can't even tell what percentage of USA orders are coming from Alabama by looking at the first page. The first page tells you that Benny – The Spokes Person, Psycho-Cycle, and The Great Bike Shop in Alabama have made a lot of orders, but that's about it — unless you're willing to riffle through a lot a pages.

You can hide specific customer information to present a more general picture of orders. If report viewers then want the specific information about any particular state, they can drill down by double-clicking that item. When a user hovers the cursor over the group header of interest, it changes to a magnifying glass. At that point, double-clicking displays the hidden detail data about individual orders.

To add drill-down functionality to this report, do the following:

1. **Switch to Design view.**

2. **Right-click the D designator to the left of the Detail band and select Hide (Drill-Down OK).**

   The Detail band appears dimmed.

3. **Switch back to Preview mode.**

   You see the report shown in Figure 6-20.

4. **Save this report as Customer Orders Grouped by State or District with Drilldown.**

This information is much more helpful for strategic decision making. You can easily see which states are contributing to Xtreme's bottom line and which are not. If report viewers want to see the detail for a specific state, they can hover the cursor over the group header or group footer for that state. Figure 6-21 shows what this looks like for Oregon.

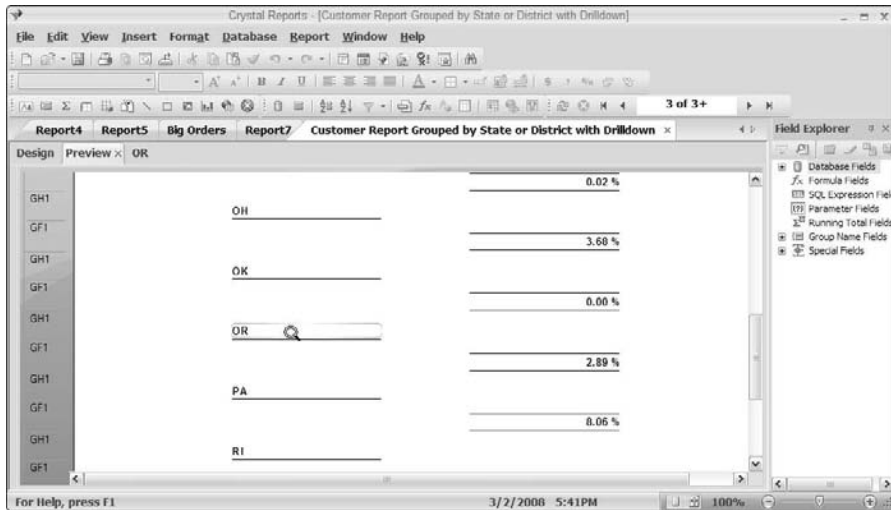**Figure 6-20:** The Customer report with the details hidden.
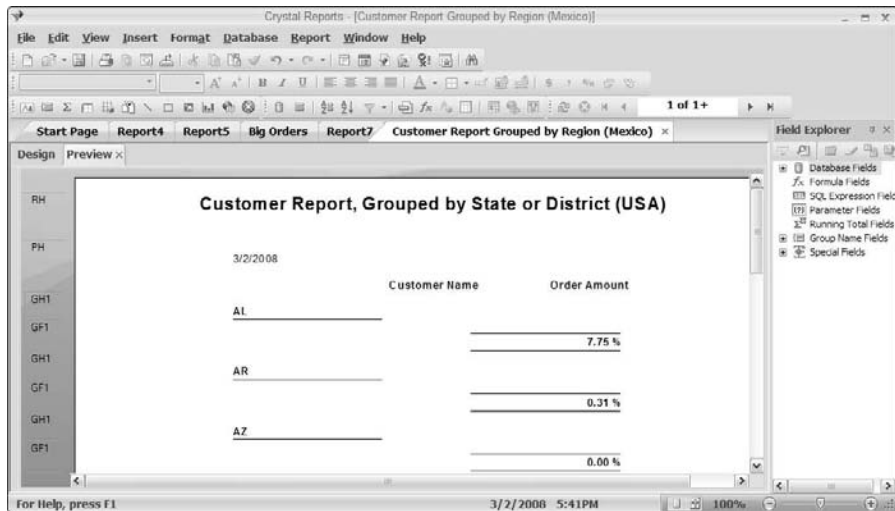
Figure 6-21:
Customer
report
showing
that there is
hidden
detail.

Double-clicking while the cursor looks like a magnifying glass drills down to
the detail level, giving you what you see in Figure 6-22.

The drill-down capability of Crystal Reports provides tremendous flexibility
to online report viewers. Different viewers can see different levels of detail,
even though they're all viewing the same report. Be sure that you save this
report before moving on to the next section.

Figure 6-22:
Customer
report with
details
shown for
Oregon.
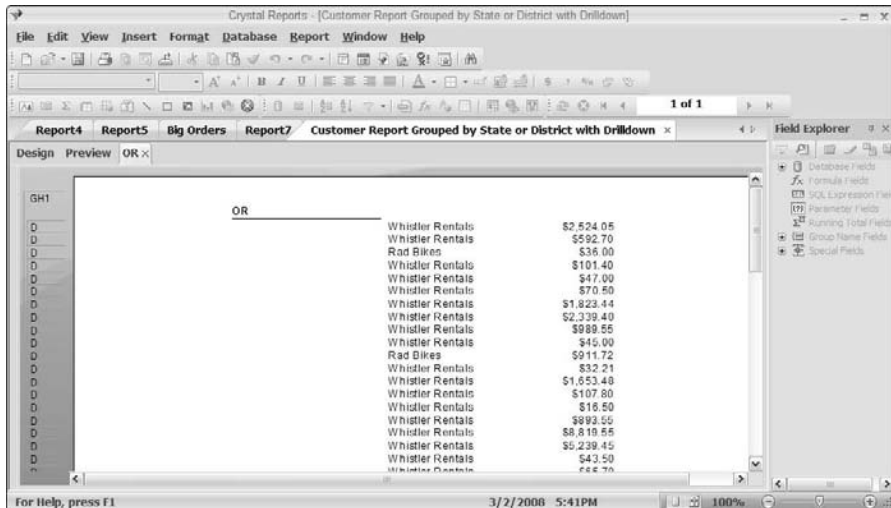
Don't try drilling down on a report that has been printed on paper. You can click all day. You can even place your mouse directly on top of the paper. It is no use; the details will not be displayed. Drill-down works only for online report viewing.

Keeping Track of Things with Running Totals

Reports with summarized group totals, like those in the preceding section, are valuable for many purposes, but they don't satisfy all needs. Sometimes it's helpful to see how the status of an item changes with time. Crystal Reports' running total facility gives you that kind of information.

To see how that might work, I build on the running example in this chapter to construct a variant of the Orders report for Mexico where the total value of all orders is tracked as a function of the order date:

1. **From the Start Page, select the Report Wizard and the `xtreme.mdb` database.**

2. **Select the Customer and Orders tables and make sure they're linked by the Customer ID field.**

3. **Add the Customer Name field from the Customer table and the Order Amount and Order Date fields from the Orders table to the Fields to Display pane in the Standard Report Creation Wizard.**

4. **For this report, skip Grouping view and move to Record Selection view.**

5. **Add the Customer table's Country field to the Filter Fields pane. In the pull-down lists that appear below, select *is equal to,* and *Mexico.***

   This means the report will display results only for Mexico.

6. **Retain the No Template option, and then click Finish.**

    You're not really finished, as you can see by looking at the report preview shown in Figure 6-23.

The running total column is not on the report, the Order Date column shows times, and the report title is missing. Switch to the Design tab to put the report into final form. You can add the title — *Mexico Orders, with Running Totals* — in much the same way that you did for the previous examples.

You can change the format of the Order Date field to eliminate the time information. Just right-click the Order Date field to display the shortcut menu. Select Format Field from the menu; then when the Format Editor appears, use it to change the date format.

Figure 6-23:
A Customer report with an incomplete running total.
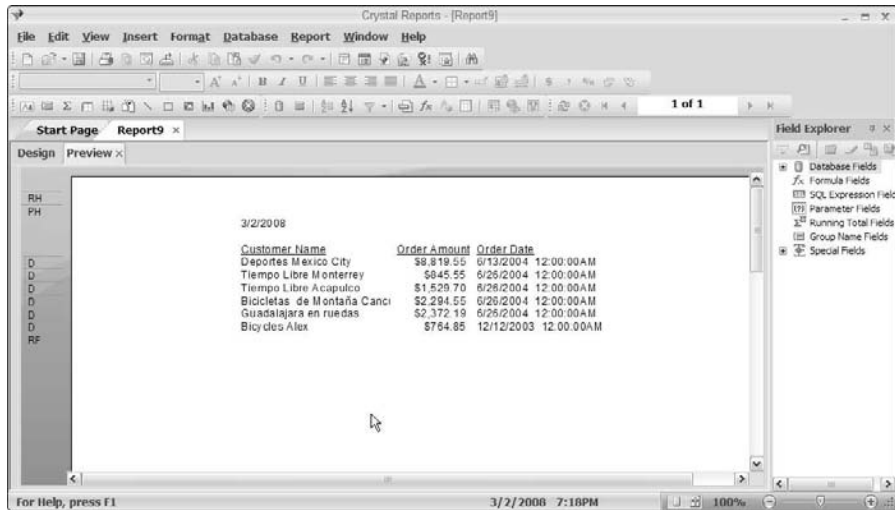
For the running total, you want to place a fourth column to the right of the Order Date column. To do that, follow these steps:

1. **Make sure that the Design tab is displayed. If Field Explorer isn't displayed, choose View⇨Field Explorer.**

   Field Explorer appears.

2. **Select the Running Total Fields option.**

3. **Click the New icon at the top of Field Explorer.**

   The Create Running Total Field dialog box appears, as shown in Figure 6-24.

Figure 6-24:
The Create Running Total Field dialog box, with a default name in the Running Total Name text entry field.
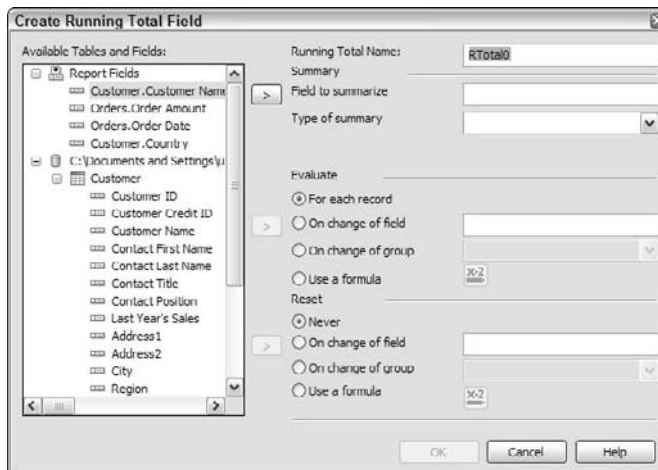
4. **In the Running Total Name box, replace the default name with** Order Total**.**

5. **In the Available Tables and Fields pane, select Order.Order Amount from the Report Fields area. Then click the > button pointing to the Field to summarize box.**

   The default *sum* appears in the Type of Summary pull-down list. This is what you want, so proceed to the next step.

6. **In the Available Tables and Fields pane, select Orders.Order ID from the Orders table. In the Evaluate area, click the On Change of Field option, and then click the > button pointing to the Evaluate area.**

   The report will display all the orders for Mexico, so you want the running total to be updated for each order (each time the Order ID changes).

7. **Because you want the running total to be cumulative for the entire report, leave the Reset option set to Never. Then click OK.**

   The Create Running Total Field dialog box disappears, once again showing Field Explorer.

8. **Drag the Order Total running total field from Field Explorer onto your report, just to the right of the Order Date field.**

9. **Dismiss Field Explorer. In the Report Header section, center the title Mexico Orders, with Running Totals. In the Page Footer section, drag the page number object to the right. Move all the elements in the page header and the details sections to the left to center them on the page.**

   Your Design view should look similar to Figure 6-25.
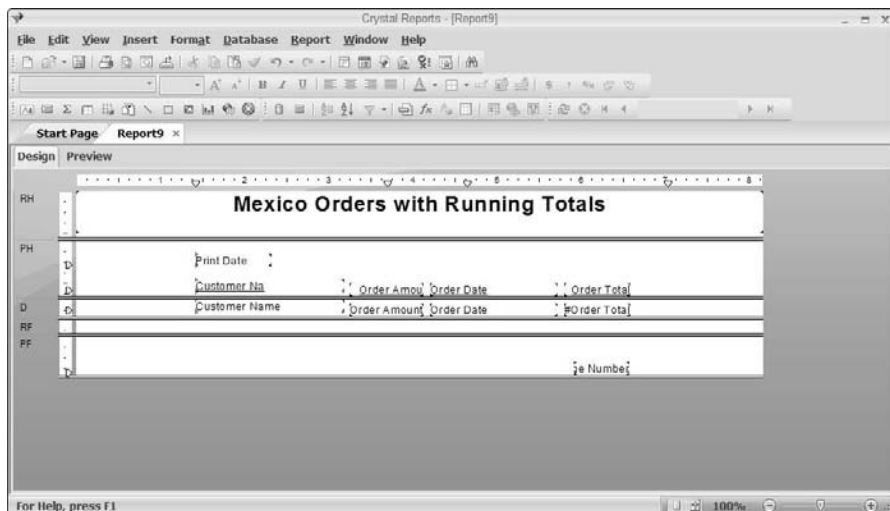
Figure 6-25: The Design view of the report with a running total column.

10. **Switch to Preview mode.**
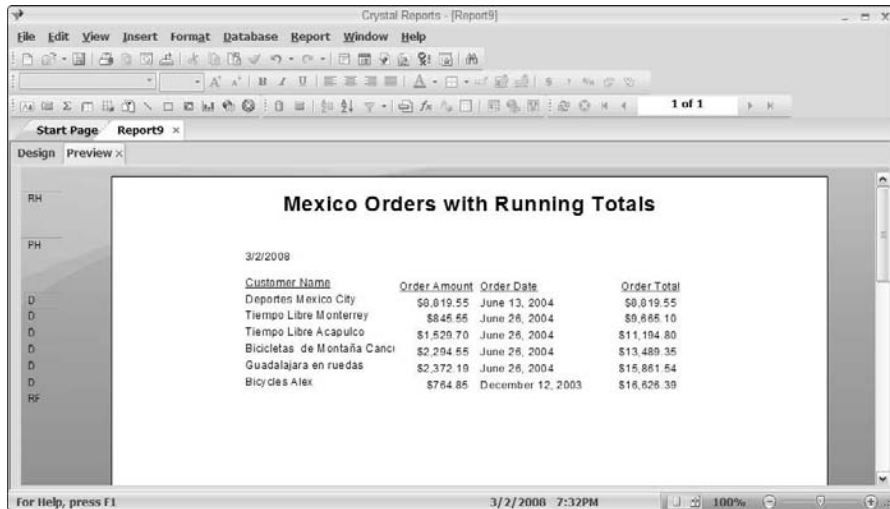
The report preview looks similar to Figure 6-26.

Figure 6-26: A preview of the report with a running total column.

The report is now nicely laid out and balanced, but it's not sorted in chronological order. To remedy that situation, follow these steps:

1. **Click the Record Sort Expert icon on the Expert Tools toolbar.**

The Record Sort Order dialog box appears.

2. **Add Orders.Order Date to the Sort Fields pane.**

3. **Leave the Sort Direction at Ascending, and then click OK.**

4. **Switch to Preview mode, if necessary.**

You can see that the report is sorted in chronological order.

5. **Save the report as Mexico Orders with Running Totals Sorted by Date.**

Troubleshooting Sorting, Grouping, and Totaling Problems

What can go wrong when you try to include sorting, grouping, or totaling in a report? In this section, I take each case in turn.

Sorting problems and how to solve them

Crystal Reports gives you many options for sorting, so many things can go wrong. Crystal Reports will always do exactly what you tell it to do. The problem is that it's not always clear what you should tell it. You can sort on one field or multiple fields. You can sort an entire report or within each group in the report.

The main solution to any sorting problem is to have a clear idea of how you want the report to be sorted:

- ✔ **Decide which fields you want to sort on and which should be specified first.** For a field with multiple sort keys, the second sort key comes into play only when multiple records have the same value for the first sort key.
- ✔ **Decide whether you want the sort to be ascending or descending.**

After you decide exactly how you want your information to be sorted, choose Report➪Record Sort Expert or click the Record Sort Expert icon to display the Record Sort Order dialog box. The left pane shows all the fields you might want to sort by; the right pane (Sort Fields) is waiting for you to add them.

You must add the fields to the Sort Fields pane in the correct order. First add the field that you want as your primary sort key; next, add the field that you want as the secondary sort key, and so on. After you choose the appropriate sort direction (ascending or descending) for each sort key, click OK to execute the sort.

In the Sort Fields pane, the letter *A* precedes fields that will be sorted in ascending order. Similarly, the letter *D* precedes fields that will be sorted in descending order. A field with multiple sort keys might be sorted in an ascending direction for one key and a descending direction for another.

Unusual grouping options

Separating report records into groups of related items is not difficult, but the rich array of options for grouping might be confusing. For example, you can sort not only individual records but also groups. You can sort the groups in ascending order, descending order, the original order in which they appear in the database, or in some other specified order. To place a new level of grouping into an existing report, choose Insert➪Group and specify the options you want in the Insert Group dialog box that appears.

You can choose to include some groups in the report and exclude others. Select Expert is the tool you use to do that job. With Select Expert, select the groups to display by specifying a field to select on or by specifying a formula that determines which groups to include.

If you've created groups in a report but later decide that the grouping you've created is not the best, you can change it. Choose Report↔Group Expert to display the Group Expert dialog box, shown in Figure 6-27.

Use this dialog box to change the field that the group is sorted by, the sort order, and the name of the group. You can specify whether you want to keep the group together after the change, and whether you want to repeat the group header at the top of each page.
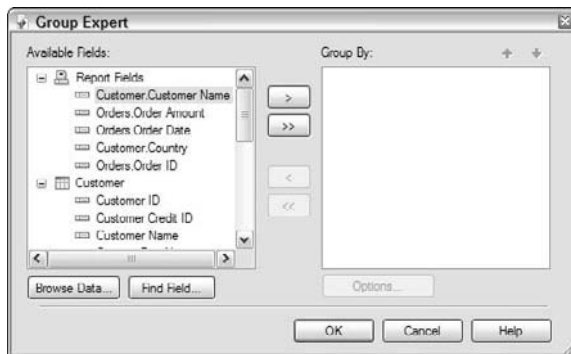
Figure 6-27: Group Expert dialog box.

Getting the right totals

Crystal Reports enables you to print subtotals in group footers as well as a grand total at the end of the report. You can also print running totals. With all these possibilities, you might specify your subtotals incorrectly. It's a good idea to run your report with a few records of sample data, for which you know what the correct subtotals should be. If what you get isn't what you expect, check how you specified the subtotals to be computed. If you find an error in how you specified a subtotal, you can delete the erroneous specification and replace it with the correct one.

Chapter 7

Mastering Report Sections

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*A*s I discuss in other chapters, Crystal Reports divides a report document into sections, including the Report Header, Page Header, Details, Report Footer, and Page Footer sections. These sections offer tremendous flexibility. A report can have multiple copies of each section, each one serving a different purpose.

You have a lot of leeway in how you format a section. You can vary the height, the background color, and even the number of columns in each section. By using Crystal Reports tools creatively, you can give your report the appearance you want.

In this chapter, you can read how to change section size, use different types of formatting, place groups, generate barcodes, and work a little postal magic.

Changing the Size of a Section

The width of a section is the same as the width of the report that the section is in. You determine this value when you set your margins.

The height of a section begins at some default value. If that value gives you the appearance that you want, you can leave it the way it is. If you want a different height for a section, say to accommodate a larger font, it's easy to change, as described next.

Consider the vertical spacing between the lines of a variant of the Mexico Orders, with Running Totals report that I show you how to create in Chapter 6. This version of the report has a box around the fields and horizontal lines

between the rows. You can add this effect to your reports in Design mode by using the Insert Box and the Insert Line icons on the Insert Tools toolbar. Figure 7-1 shows the result.

In addition to adding a box around the text, I added a horizontal line above each line of text. To do this, in Design mode, expand the height of the Details section by dragging down its lower boundary line. Make this easy adjustment by following these steps:

1. **Make sure you are in Design mode.**

2. **Move the cursor to the bottom of the Details section.**

   The cursor changes shape, as shown in Figure 7-2. When the cursor takes on the appearance of the sizing cursor, you can use it to drag the section boundary up or down to give you the vertical height you want for the section in question.

3. **If necessary, you can adjust the height and width of a text box to give you the appearance you want. You can also adjust the positioning of the text boxes, both vertically and horizontally, leaving you with a report looking like Figure 7-1.**

Make sure you don't drag a text box border line beyond the boundary line of a section. If you do, you get a weird result that you probably don't want.

Insert Line

Insert Box
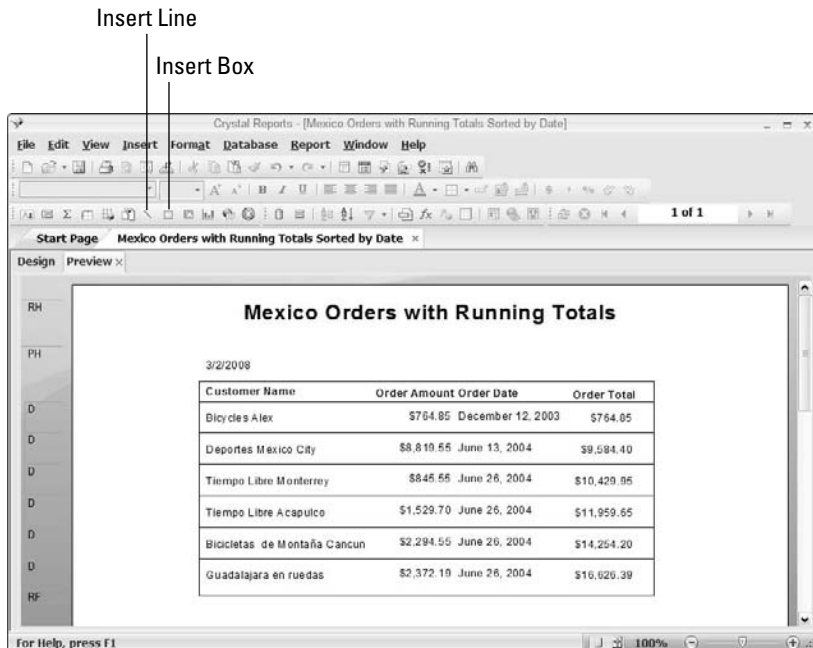
Figure 7-1: An enhanced version of the Mexico Orders, with Running Totals report.
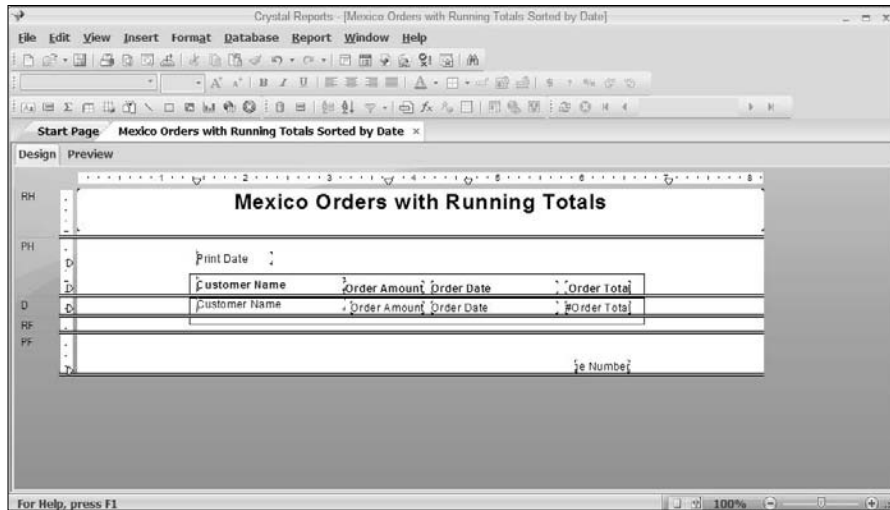
Formatting with the Section Formatting Menu

To create a summary report in Chapter 6, I show you how to use the Hide (Drill-Down OK) function from the Section Formatting menu. Right-clicking in the area to the left of a report section displays a contextual menu. The options on the Section Formatting menu (as shown in Figure 7-3) provide you with a convenient way to make basic formatting changes to a section. Figure 7-3 shows the menu for the Details section, as seen in Preview mode.

The following list provides a brief description of each option in this menu:

- **Hide (Drill-Down OK):** Doesn't display this section of the report but allows the user to drill down to view it.

- **Suppress (No Drill-Down):** Doesn't display this section of the report and doesn't allow the user to view it by drilling down.

- **Section Expert:** Displays Section Expert. You can read more about this tool shortly.

- **Show Long Section Names/Show Short Section Names:** Toggles between showing either full or abbreviated section names.

- **Insert Line:** Adds an additional horizontal guideline to the section. If there's not enough room for an additional line, the section is automatically expanded to accommodate the additional guideline.

✔ **Delete Last Line:** Deletes the bottom guideline from the section and raises the bottom of the section up to just below the next higher guideline.

✔ **Arrange Lines:** Arranges guidelines vertically so that they're evenly spaced. Adds more guidelines if there aren't enough.

✔ **Fit Section:** Brings the bottom of the section up to the bottom of the lowest object, removing any guidelines that are lower.

✔ **Insert Section Below:** Adds another section of the same type as the current section, just below it. We'll be covering this soon.

✔ **Select All Section Objects:** Selects all objects in the section. This can be useful if, say, you want to move everything over to the right by a half inch. It beats moving each item individually and trying to maintain their relative positions.
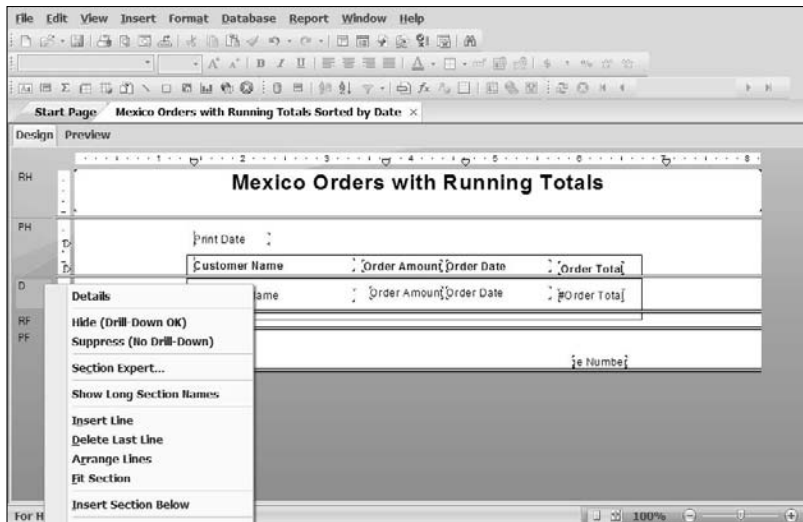
Figure 7-3: Formatting changes you can make in the Details section.

Using Section Expert for Easy Section Formatting

Section Expert is the primary tool you use to change the formatting of a section. With it, you can set a number of options to determine what is displayed, how it's displayed, and what color the display is.

Invoke it by clicking the Section Expert icon on the menu bar. Section Expert has three tabs: Common, Paging, and Color.

Common tab, Section Expert

Figure 7-4 shows the default settings for the Report Header section of the Common tab. (Each section has different default settings.)
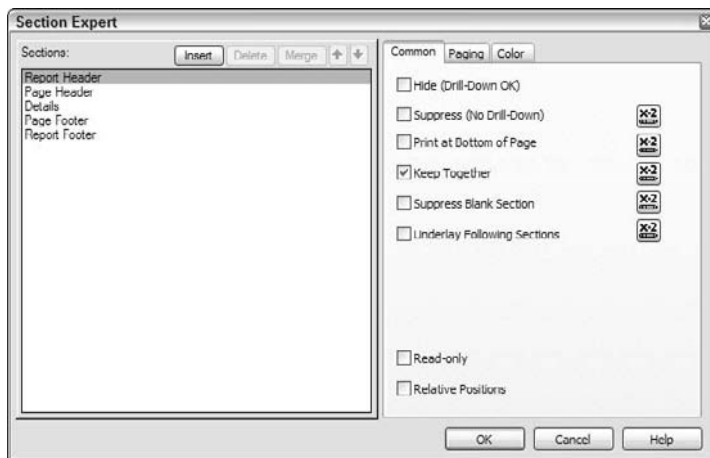
Figure 7-4:
The Common tab for the Report Header section.

Here is a short description of the options on the Common tab:

- ✔ **Hide (Drill-Down OK)** hides the section. However, drilling down displays the section's contents.

- ✔ **Suppress (No Drill-Down)** hides the section, and drilling down does not override the suppression.

- ✔ **Print at Bottom of Page** prints the section at the bottom of the page. This option doesn't make much sense for a Details section, but it's useful when applied to a Report Footer that otherwise could be printed near the top of the last page of a report.

- ✔ **Keep Together** prevents a page break in the middle of a section. This option is useful if a section contains a small number of detail lines that should be viewed together, regardless of where they happen to fall on a page.

- ✔ **Suppress Blank Section** closes the gap between the preceding and the following sections if a section is blank. If this option is not selected (checked), the empty space assigned to the section is on the report.

- ✔ **Underlay Following Sections** prints the section and then prints all the following sections right on top of this one. The function is often used to apply a watermark to a page. It can also be used to overlay two types of content, such as text and a chart.

Clicking the Formula Editor icon (located to the right of most of the options) on the Common tab displays Format Formula Editor. With this editor, you can write a formula that tests a condition. For true/false conditions, if the condition is satisfied (true), the chosen formatting option is applied; if false, the formatting option is not applied. For multivalued conditions, an If-Then-Else structure is used, which defines which one of several formatting options to apply. For more on formulas, see Chapter 10.

Paging tab, Section Expert

Figure 7-5 shows the Paging tab of Section Expert.
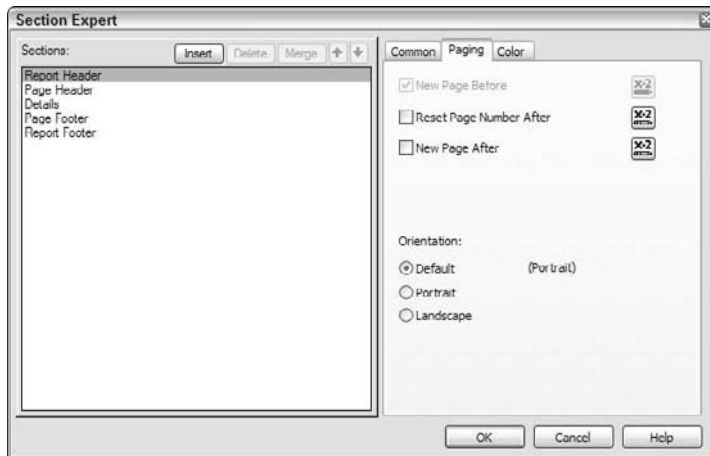
Figure 7-5:
The Paging tab for the Report Header section.

The Paging tab is a new feature of Crystal Reports 2008. The first option on this tab, New Page Before, is grayed out because the New Page Before option doesn't apply to the report header (which is what is selected in the figure). This makes sense because nothing comes before the report header. However, this option is active for the Details section and the Report Footer section.

The second option, Reset Page Number After, resets page numbering to the beginning of the sequence. For example, if you apply this setting to a Group Footer, the first page of the next group is numbered 1 rather than the number that would follow the last page number of the current group. You can read about groups in Chapter 6.

Gee. I guess I haven't really explained what a Group Footer is yet. Just as a Page Header is located at the top of every page and a Page Footer is located at the bottom of every page, a Group Header is located at the top of a group and a Group Footer is located at the bottom of a group. Group Footers are a great place to put totals or other summary information.

The third option, New Page After, prints the next section after the current one at the top of a new page.

The orientation options, portrait and landscape, are self explanatory.

Color tab, Section Expert

From the Color tab, you can specify a background color for a report section. Each section can have a different background color. To do so, use the Format Formula Editor to write a formula that specifies which sections have a specific background color. I discuss formulas in detail in Chapter 10. Figure 7-6 shows the Section Expert Color tab.
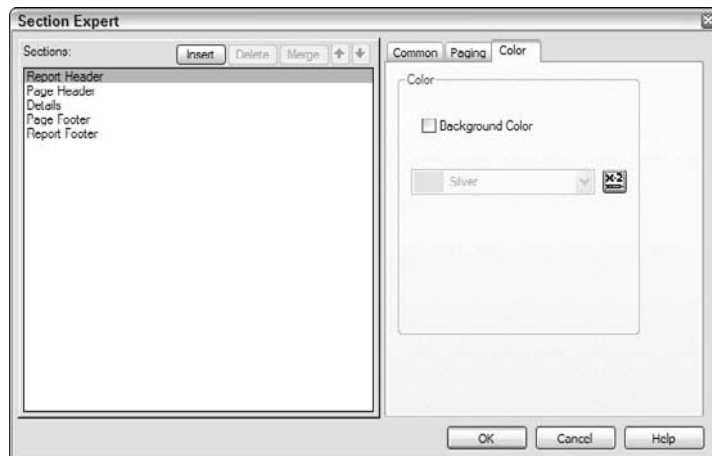
Figure 7-6: You can change the background color of a report section.

If you don't select the Background Color option, Crystal Reports doesn't give the background any color. Selecting the check box activates the drop-down list and basic color-choice palette, as shown in Figure 7-7.

Quite a few colors are available. If the standard choices don't meet your needs, click More to display a more-comprehensive Color palette. As shown in Figure 7-8, you can define thousands of colors from the Color palette.
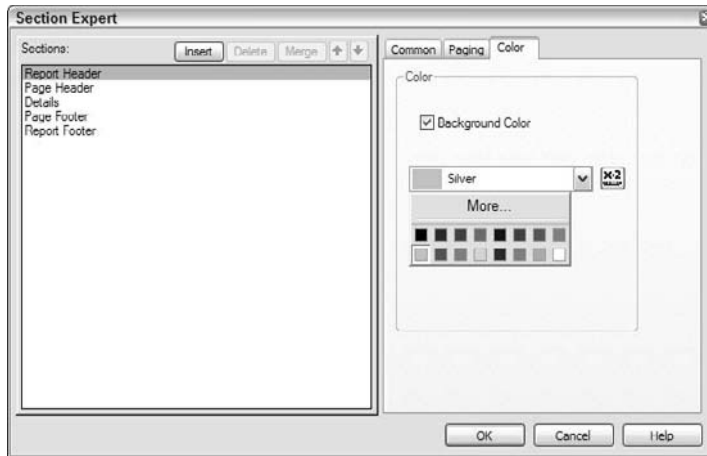
Figure 7-7:
Color tab,
with pull-
down list
activated.
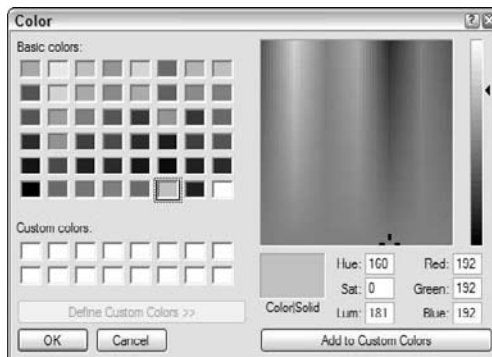
Figure 7-8:
Select any
hue,
saturation,
and
luminance
you want, as
well as
fractions of
red, green,
and blue.

Good design principles suggest that you select color schemes that are appropriate for the material you are presenting. Also make sure that there is sufficient contrast between the color of your text font and the background.

Using different colors for different sections

You can specify a background color for each section of your report. Depending on the effect you want to convey, you might leave all section backgrounds uncolored or maybe create a rainbow effect, with each section a different color. A more conservative approach is to use colored backgrounds sparingly but tastefully.

Be aware of how your users will view your report. If you anticipate that your viewers will print the report on a black-and-white printer, don't go overboard with color. However, if users will view the report on computer screens or will print it on a color printer, take advantage of the expanded possibilities that color gives you.

Giving reports a classic banded look

You can simulate a classic banded look in your reports by using a conditional formula. To demonstrate this, follow these steps to add silver bands (or bands of any other color) in the background of the Big Orders report that I show you how to build and save in Chapter 5.

1. **Open the Big Orders report and switch to the Design tab.**

2. **Right-click the Details tab and choose Section Expert.**

3. **In Section Expert, switch to the Color tab.**

4. **In the Sections area, select the Details section.**

5. **Select the Background Color check box.**

6. **From the pull-down list, select a color and then click the Formula Editor icon.**

   For this example, select Silver (or whatever color you prefer). Formula Workshop appears in Format Formula Editor: Background Color mode.

7. **In the text area in the bottom half of the editor, enter the following formula, replacing *color* with the color you selected:**

   ```
   If Remainder (RecordNumber, 4) In [1,2] Then color Else NoColor
   ```

   If you follow along with the example, the formula should be the same as the one shown in Figure 7-9. The comments show how to specify a color: in this case, crSilver.
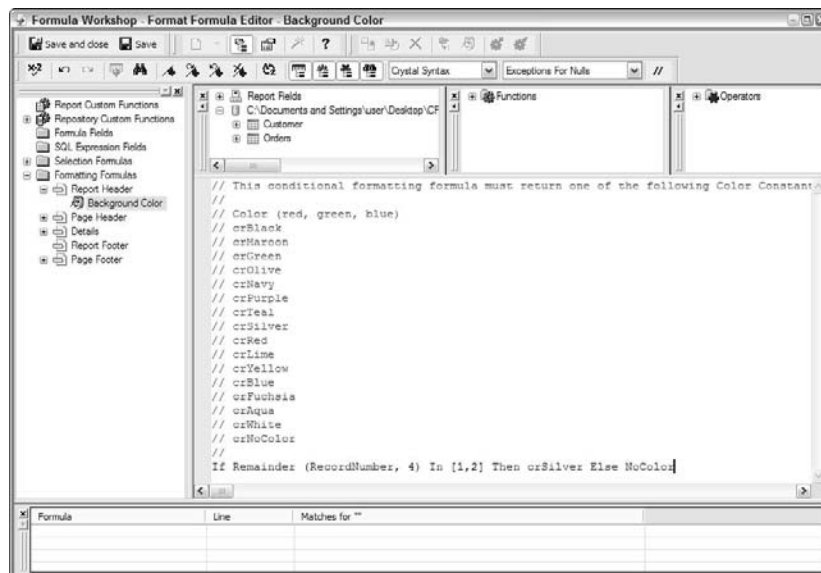
Figure 7-9:
Adding
the color
banding
formula.

8. **Click the Save and Close button.**

9. **Click OK in Section Expert to dismiss it.**

10. **Switch to the Preview tab.**

You can see the effect of this change on the single-month Orders report, as shown in Figure 7-10.

This report brings back memories of the good old days (which you can read about in the nearby sidebar) and also makes it easy to correlate the Order Amount on the right with the Customer Name on the left.

Figure 7-10:
The report on simulated banded paper.

Placing Groups Where You Want Them

Depending on the type of report you're creating, you might want to depart from the default positioning of groups within the Details section or of an entire section. You can do so in several ways.

Starting each group at the top of its own page

Suppose that you have a number of groups, and each group includes a large number of detail lines. Each group ends at some random place in the middle

of a page, with the next group following immediately. For large groups, you might want to start each group at the top of a new page, which will provide a proper separation between groups.

Figure 7-11 shows the top of one page of Xtreme's Customer Report Grouped by State or District (USA). It has the last of many records for California, followed by the Colorado group.

For branch managers responsible for single states, it makes sense to have each state's records start on a new page. This makes it easier to distribute the appropriate information to the appropriate manager, while not revealing what is happening in other states.

Figure 7-11: The Customer Report page showing California and Colorado records.

Printing reports old school

Back in the early days of computing (the 1950s and 1960s), computers printed reports on wide paper that was sprocket-fed through electro-mechanical line printers. The paper had sprocket holes on the left and right edges and alternating green and white horizontal bands. Each band was high enough to hold two printed lines. The bands helped you keep lines of print straight when you scanned across the paper from left to right.

To make each group start on a new page, follow these steps:

1. **Right-click the GH1 (Group Header 1) area to the left of the first group header on the report and choose Section Expert from the contextual menu that appears.**

   Section Expert appears; refer to Figure 7-4.

2. **On the Paging tab of Section Expert (refer to Figure 7-4), select the New Page Before option.**

   On a report such as this one, which has a report header, selecting this option causes a page feed after the report header is printed on the first page, and the first group will appear at the top of the second page. Here's how to avoid this problem:

   a. *When you select the New Page Before check box, also click its Formula Editor button to display the Format Formula Editor.*

   b. *In the formula entry area, type **Not OnFirstRecord**.*

      This ensures that the first group always prints on the first page of the report.

3. **Click the Save and Close button to close the Format Formula Editor and then click OK in Section Expert.**

Printing totals at the bottom of a page

For a multipage report with subtotals for each group and a grand total at the end, you might want to print the grand total at the bottom of the last page. This is not the default format in Crystal Reports, which puts the grand total immediately after the subtotal for the last group, as shown in Figure 7-12.

Xtreme did not have many sales from West Virginia (WV), so the grand total prints near the top of the last page. Printing the total at the *bottom* of the page is another job for Section Expert:

1. **Right-click in the area to the left of the Report Footer section and choose Section Expert from the contextual menu that appears.**

2. **On the Common tab (refer to Figure 7-4), select the Print at Bottom of Page check box.**

   This puts the grand total at the bottom of the page, where it's traditionally located.
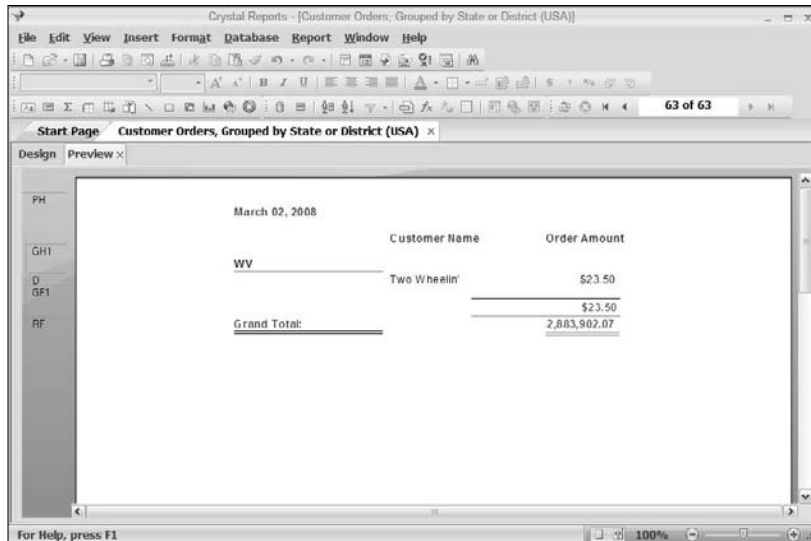
Figure 7-12:
The grand total is near the top of the last page of this report.

Restarting page numbering at the beginning of each group

If you're starting each group on a new page and the group extends for multiple pages, consider restarting the page numbering every time you start a new group. This causes less confusion for those folks who receive a distribution from their manager consisting of only their own group. Here's how to restart page numbering at the beginning of each new group:

1. **Access Section Expert from the Group Footer.**
2. **Select the Reset Page Number After option on the Paging tab.**

Hiding Details with Summary and Drill-Down Reports

In Chapter 6, I give you a brief look at summary reports and how to drill down into them to see the hidden detail they contain. By making a simple selection from the Section Formatting menu, you can choose to either display or hide a report's detail information. You can print a detailed report for one client, and then print a summary that hides the detail but shows the summary information in the group footer for another client.

For example, say you give a full, detailed report to a branch manager responsible for a single state but give a drill-down-able summary report for a national sales manager. In addition, though, you can also produce a summary report for which drill-down is not possible. And — bonus — you can produce all three types of reports from the same basic report.

To create a drill-down-able report, use the Hide (Drill-Down OK) option from the Section Formatting menu. Conversely, to create a similar summary report for which drill-down is not enabled, use the Suppress (No Drill-Down) option instead. With one report, you can satisfy the needs of three classes of users. Sweet.

Generating Barcodes

These days, just about anything you can buy comes with an identifying barcode. Barcodes are fantastically useful. In inventory applications, reading a product barcode when a product leaves a warehouse automatically decrements the units-in-stock tally for that item. Barcodes also eliminate a lot of mistakes that easily happen when a human has to enter a long, meaningless number via keyboard. Crystal Reports 2008 gives you the ability to convert not only numeric fields, but also text fields and date/time fields, into barcodes.

You might ask, "Why would anyone want to put a barcode into a report?" Good question. You *wouldn't* want to put barcodes into a sales report or a customer list. But, as I mentioned, barcodes are fantastically useful, and you can use Crystal Reports to generate them. Just put label paper into your printer and print away! Crystal Reports enables you to put machine-readable identifiers on your products at minimal cost, because you already have Crystal Reports and the computer it runs on.

To demonstrate the barcode function, follow these steps to add barcodes to the Product Price List I show you how to create in Chapter 2.

1. **Open the Product Price List report, as shown in Figure 7-13.**

2. **In Design view, pull down the bottom boundary line of the Details section to provide room for a barcode on each line.**

3. **Right-click one of the entries in the Product ID column.**

   The menu, shown in Figure 7-14, appears.

Figure 7-13:
Product
Price List
report.
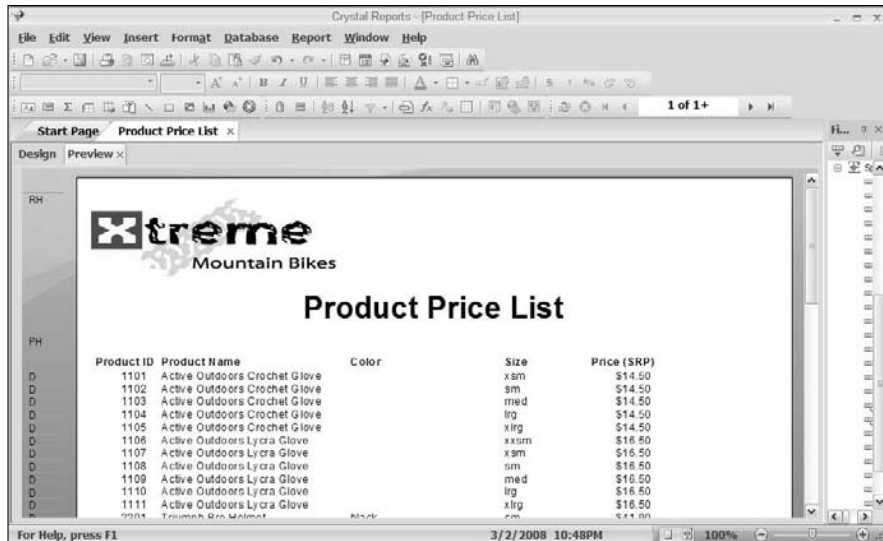
Figure 7-14:
Contextual
menu for the
Product ID
field.
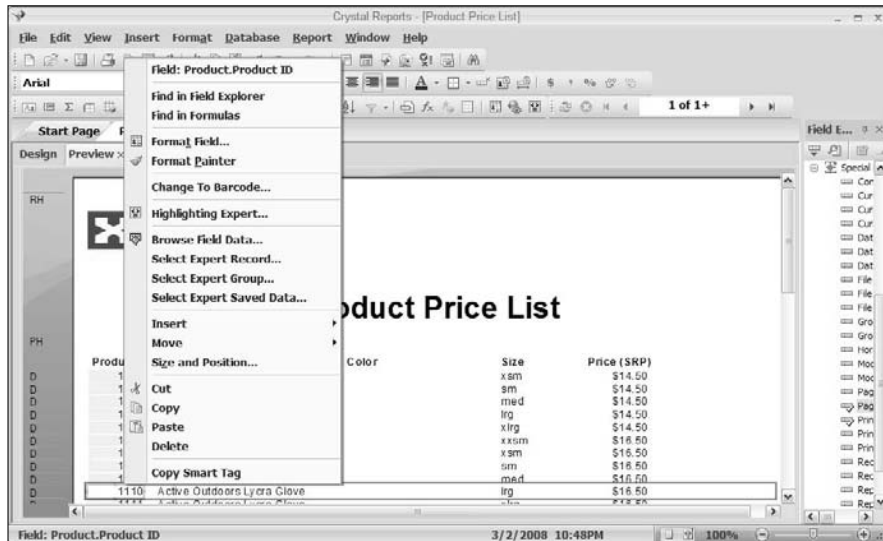
4. **Choose Change to Barcode.**

    The Select Barcode Type dialog box displays, as shown in Figure 7-15.

5. **Choose the Code 39 Full ASCII option and then click OK.**

6. **Switch to Preview mode.**

   A barcode corresponding to the Product ID is inserted on every detail line (see Figure 7-16).

Because this sample report wasn't initially designed to contain barcodes, the placement is rather arbitrary. Crystal Reports chooses to locate the barcode in the first blank area it could find beyond the Product ID field. If you plan at the beginning to include a barcode in a report, allocate space for it after the field from which it is derived.
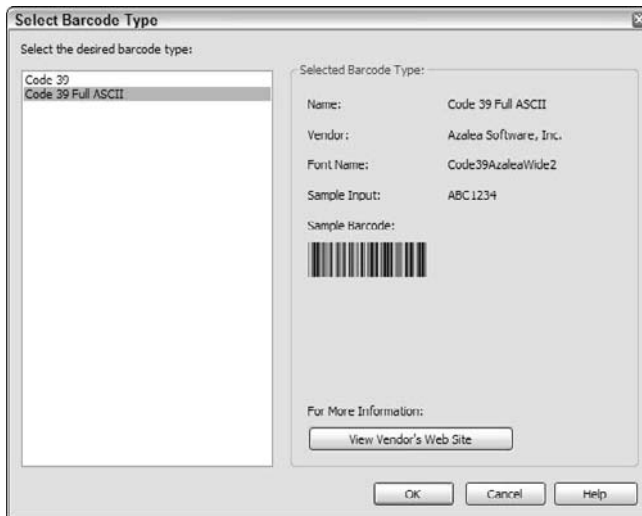
Figure 7-15:
Select Barcode Type dialog box.
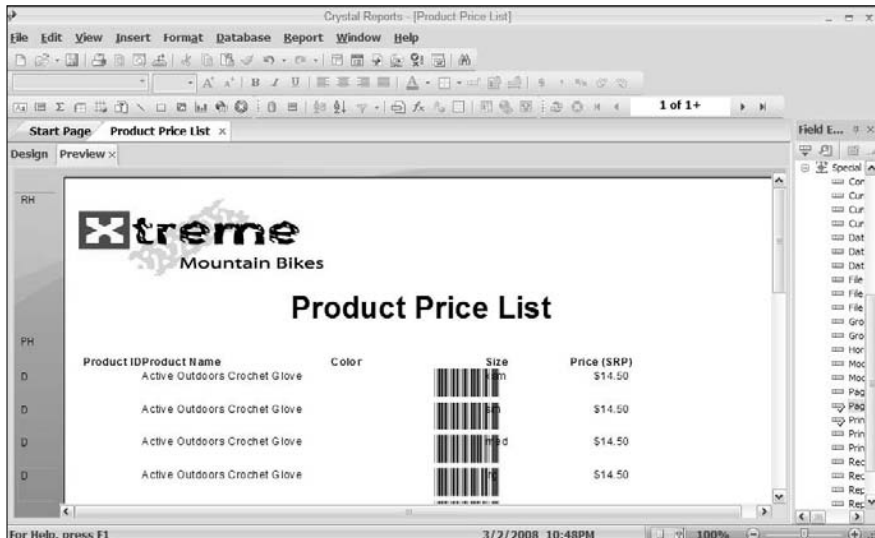
Figure 7-16:
Barcodes have replaced the Product IDs in the report.

Creating Mailing Labels

You'll use multicolumn reports in a variety of situations. One example is a report for printing three or four columns of mailing labels on 8½ x 11" label stock. Crystal Reports recognizes that people frequently want to print mailing labels, so it provides the Mailing Label Report Wizard for this task.

To create a report that prints mailing labels in multiple columns, follow these steps:

1. **From the Crystal Reports Start Page, select Mailing label report wizard and then click OK.**

2. **In the wizard, connect to the `xtreme.mdb` database and add the Customer table to the Selected Tables pane.**

   For more information on this process, see Chapter 2.

3. **Click Next to display Fields view.**

4. **Add the following fields from the Available Fields pane to the Fields to Display pane: Contact First Name, Contact Last Name, Customer Name, Address 1, Address 2, City, Region, and Postal Code.**

5. **Click Next to display Label view.**

   In Label view, you can select a standard label type or specify the dimensions and margins of nonstandard labels. You can also specify the direction in which they will be printed: across the page and then down, or down and then across.

   The standard label choice includes not only labels that you might put on envelopes, but also disk labels, audiocassette labels, videotape labels, and Rolodex cards.

6. **Select a standard label type.**

   For this example, choose Avery 5160.

7. **Click Next to display Record Selection view.**

8. **Specify which records you're printing labels for.**

   For this example, suppose you want to write to customers only in the United States. You can restrict the label printing to those customers by specifying that the Country field from the Customer table is equal to USA.

9. **Click Finish.**

   You get the report shown in Figure 7-17.

Hmm. The three columns of labels aren't laid out in the most readable way. To correct that, follow these steps:

1. **Switch to the Design tab to move things around a little; see Figure 7-18.**

Figure 7-17:
Mailing
labels
produced by
Mailing
Label
Expert.

Figure 7-18:
Design
view of the
mailing
labels.
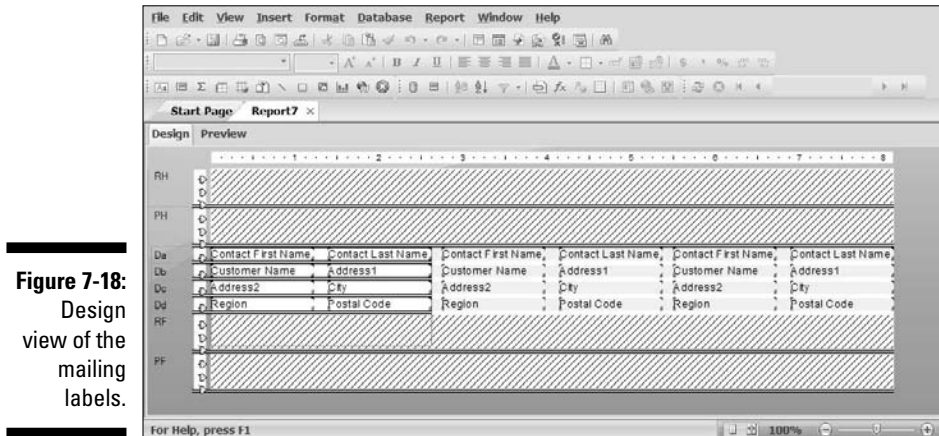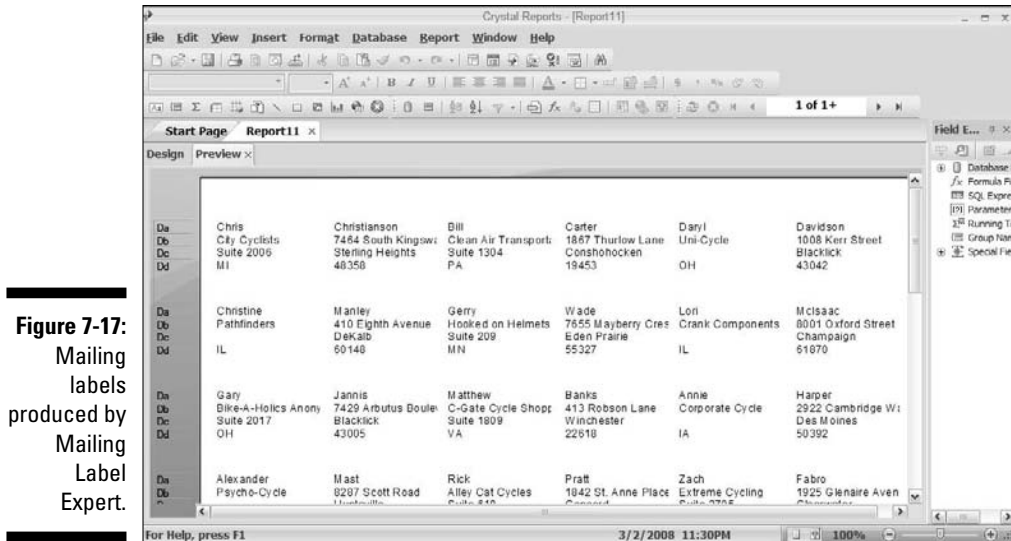
    2. Concatenate the Contact First Name field and the Contact Last Name field on the first line, to make a full name with one space between the first and last.

        a. Move the fields into the Page Header temporarily.

        b. Click the Insert Text Object icon and place a text box into the Da section.

        c. Expand the text box to the full width of the label.

        d. Drag the Contact First Name into the text box.

e. Right-click the text box to display the context menu and select Edit text.

f. Locate the cursor immediately after the Contact First Name item and enter a space.

g. Drag the Contact Last Name item into the text box and drop it after the blank space.

You have to right-click in the Da section and choose Edit Text from the contextual menu to insert the blank space.

3. **Concatenate the Address1 and Address2 fields on the third line, putting a couple of spaces between them.**

a. Move Address2 and City out of the way temporarily.

b. Click the Insert Text Object icon and drag a text box into the Dc section.

c. Drag the Address1 and the Address2 fields into the text box.

d. Insert the editing cursor between the two fields, and press the spacebar twice.

4. **Move Region and Postal Code out of the Dd section, and then drag a text box down into that section. Move City into the text box in Dd.**

5. **Type a comma and a space after the City field, and then move the Region field after that. Follow Region with a space, and then drag Postal Code into the text box after the space.**

The result should look similar to Figure 7-19.
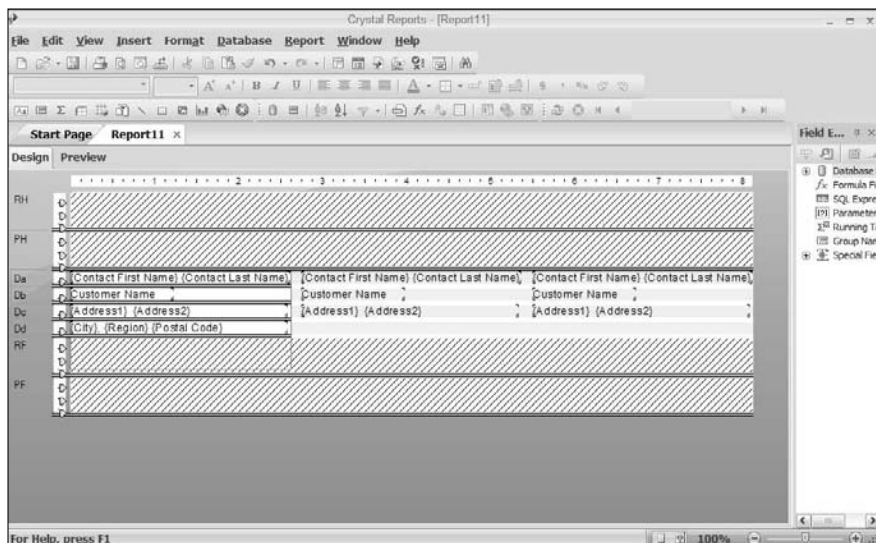
Figure 7-19: Design view of the modified mailing labels.

6. Switch to the Preview tab.

Your report should look similar to Figure 7-20. These labels look great and will fit nicely on the Avery 5160 label stock.
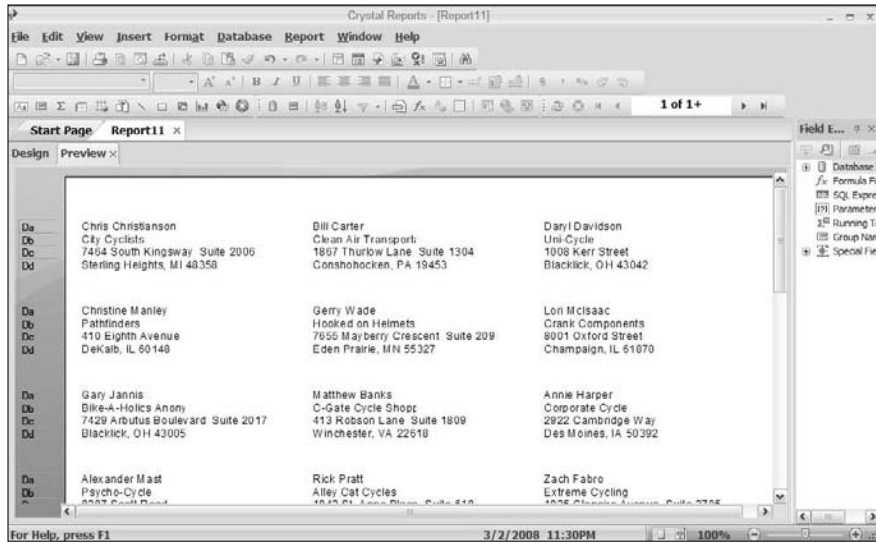
Figure 7-20: A preview of the modified mailing labels.

Saving Money on Postage with a ZIP Sort

Figure 7-20 shows an example of how the addresses would print on label stock. The labels look great, but they're in the order in which they were entered into the database — which means no particular order at all. That matters because the United States Postal Service (USPS) offers a postage discount on mass mailings of first-class letters *if the letters are sorted by ZIP code when you bring them to the post office.*

Sure, you could create your labels, apply them, and then sort your mailing by ZIP (ugh), but let Crystal Reports help you by printing your labels in ZIP-sorted order in the first place. That way, your labels are in order while you apply them.

Start with the report shown in Figure 7-20 and then follow these steps:

1. In Design mode, click the Record Sort Expert icon.

The Record Sort Order dialog box appears.

2. In the Record Sort Order dialog box that appears, add Customer.PostalCode to the Sort Fields pane.

3. Leave the sort direction as Ascending and then click OK.

4. Switch to Preview mode.

The report shown in Figure 7-21 appears. The labels are now sorted in ZIP code order, going down the page. Lovely!
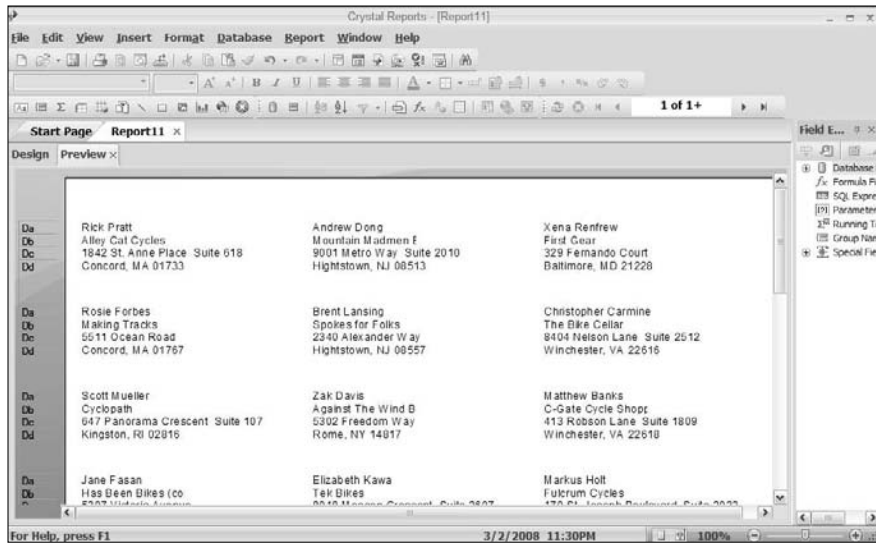
Figure 7-21:
Mailing labels, sorted by ZIP code.

Chapter 8

Enhancing Your Report's Appearance

*F*ormatting is the primary reason for the existence of Crystal Reports — or any report-writing software, for that matter. Any ol' database management system (DBMS) can retrieve results from a database and then display or print them. The primary purpose of a DBMS is to *maintain data.* Putting retrieved results in the most understandable form isn't the DBMS vendor's job.

Crystal Reports offers you a comprehensive, creative array of tools that you can use to excel at transforming the raw data retrieved from a DBMS into a report that communicates your data to your desired audience. To achieve your goals, use the full power of formatting in Crystal Reports to shape the appearance of any report you generate, which allows you to create the desired impression for your readers.

In this chapter, I compare absolute and conditional formatting, showing you the advantages of using one or the other. I go on to describe the Crystal Reports formatting tools at your disposal, including Highlighting Expert, Report Alerts, and Report Templates.

Absolute Formatting

Absolute formatting is the regular kind of formatting that you can apply to text and fields with Crystal Reports in your quest to present data the best way for your audience. After you apply absolute formatting, the format is fixed, regardless of the values of the data making up the content of the report.

WARNING! I also want you to note the following, which is both a good and a bad thing about using absolute formatting: After you set a format with absolute formatting, the format is fixed unless you change it from the Design tab or Format Editor. Every time you run the report, the formatting is the same.

Absolute formatting can comprise setting how elements and text look — fonts, font color, centered or bold text, and so on — as well as how certain elements are presented, such as a date format.

Setting the fonts and their formatting for emphasis

Sure, the report might show what you want, but consider giving the report more visual appeal by changing the fonts of various report elements. A change as simple as making the text bold is a snap. Just select the text you want to change (in Design view, double-click the text box) and then click whatever formatting icon you want (say, Bold) from the Formatting toolbar.

Choosing the best font for the job, though, takes a little more consideration. You want the data presented in your report to be as clear, informative, readable, and attractive as possible. With that in mind, take the following into consideration:

✔ **Readability**

   Choose a font that is easy on the eyes. The tried-and-true fonts, such as Times New Roman and Arial, are pretty safe choices.

   Choosing a font couldn't be much more easy. Just select the font you want from the appropriate pane at the left end of the formatting toolbar. If you don't like what you see, it is easy to choose another.

✔ **Viewer-available**

   Choose fonts that are likely available on all the computers and printers used by the people who view the report.

If viewers don't have the same fonts loaded on their machines, Crystal Reports substitutes the one that it thinks is the closest to what you have specified. To see the most common fonts — the ones I recommend that you use to assure universally readable reports — see Table 8-1.

✔ **Appropriate**

Choose fonts that fit your report. As I mention earlier in the book, you probably want to stick with something staid for a standard corporate presentation. However, if your business is a little on the adventurous side, you can get away with something sharper. Just envision your audience, and make sure that avante garde doesn't mean unreadable.

✔ **Color**

Don't overlook using a color for your font. Color can really make a heading or a block of text stand out and command attention. Of course, that assumes that your viewer will be seeing this in color (not a problem in a slideshow or an online venue) or printing in color (a little more risky). Just remember to make the font color harmonize with whatever background color you choose. Of course, black text on a white background is very readable, and black text on a yellow background is supposed to be the most readable combination available. If you really want something to stand out in red text, though, avoid using that fuchsia background that caught your eye.

Here's how to change font color:

    a. Right-click the text you want to change.

    b. Choose Format Field or Format Text (whichever is an option on the context menu that appears) to display the Format Editor.

    c. On the Font tab, choose whatever as the font color. You can also choose font, font style, and font size from here.

✔ **Variety and continuity**

You can certainly mix and match fonts — to a point. Generally accepted design rules call for using sans serif fonts (without serifs, like Arial) for major headings and serif fonts (such as Times New Roman) for body text. Don't get carried away and use a lot of fonts, styles, colors, and sizes just because you can. Too jumbled an appearance gives you report an amateur look. On the other hand, using the same font for a repeated element adds an air of professionalism and continuity to your reports, giving readers a visual cue as to what a section will contain.

✔ **Size**

Common sense will see you through this choice. Choose larger sizes for headings, smaller for subordinate headings, and smaller still for body text.

Table 8-1	Safe, Common Fonts
Name	*Looks Like This*
Times New Roman	Times New Roman
Arial	Arial
Courier New	Courier New
Bookman Old Style	**Bookman Old Style**

In this section, I show you how to tinker with the formatting in the Customer Report, Grouped by Region (Mexico), which is one of the reports from Chapter 6. The report is shown in Figure 8-1.

Figure 8-1:
The Customer Report, Grouped by Region (Mexico) from Chapter 6.
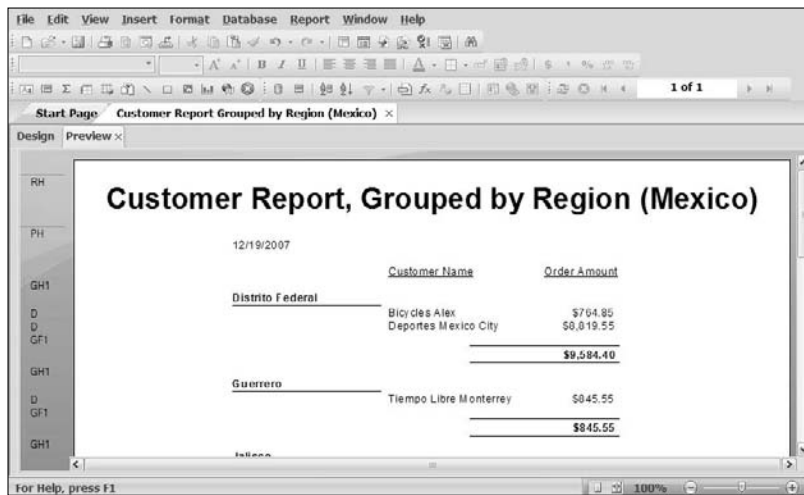
Sure, the report shows what you want, but consider giving the report more visual appeal by changing the fonts of various report elements. For example, alter the report title:

1. **In Design view, click the report title.**

2. **From the contextual menu that appears, right-click the text to activate Edit Text mode, and then select the entire title.**

3. **From the Formatting toolbar, choose one or more of the fonts available on your machine to give the report title a different look.**

WARNING!

Make sure that whatever font you choose is also available on all the computers and printers used by the people who view the report. This is not a problem if you work in an organization where everyone has the same standard software on their machine. In a more diverse environment, you might have to give some thought to what might be running on your target audience's machines. Alternatively, you could play it safe and stick to the fonts listed in Table 8-1.

4. **Select the style, size, and color of the font.**

   In the present case, the style (bold, italic, and so on) and size are fine, but you might want to experiment with font color to get the look you want. Here's how:

   a. *Right-click the text you want to change.*

   b. *Choose Format Text to display the Format Editor.*

   c. *On the Font tab, choose whatever as the font color.*

   Figure 8-2 shows the report at this point (in black and white).

I chose the Bookman Old Style font face — a distinctive font, available on Windows machines — for the report title. I chose green as the color for the report title, date, grand total in the report footer, and the group headers. You can't see that in this book, but the color change adds some contrast to the report, grabbing more of the reader's attention.

I think that centering the date is a good idea. You might also want to change the date format. Crystal Reports provides a presentable default format — March 08, 2008 — but you can choose from many others: for example, 08-Mar-2008. Figure 8-3 shows the Date tab of Format Editor with a longer date format selected.
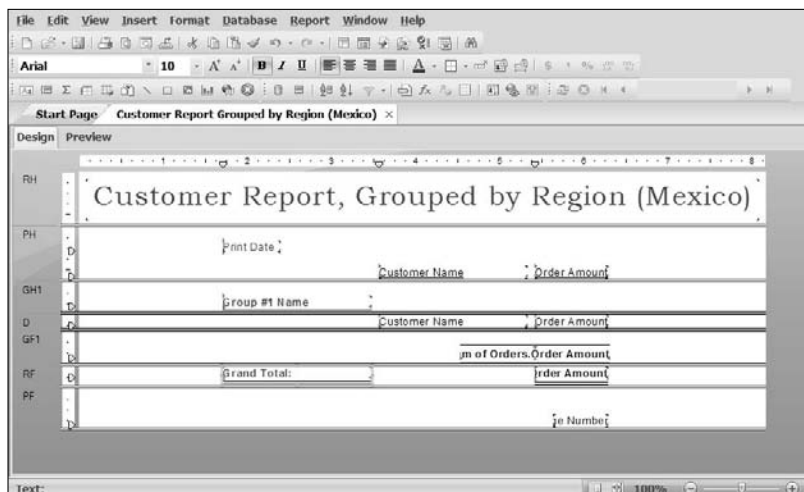
Figure 8-2:
Selected font and color changes.

Figure 8-3:
Format
Editor's Date
tab, with
Month Day,
Year
selected.
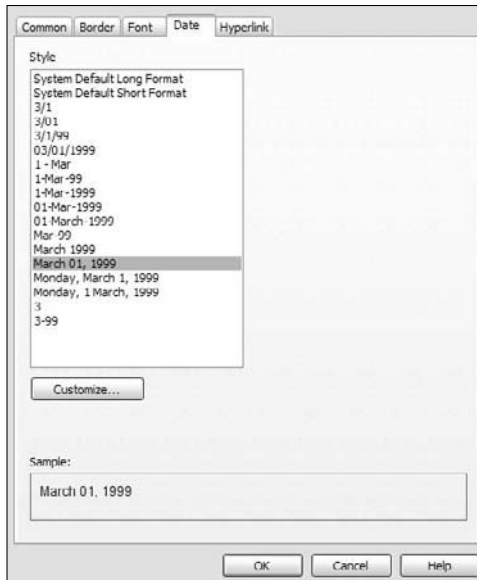
Adding graphical elements for emphasis

Another technique you can use to improve the visual appeal of your reports is to add graphical elements (such as lines and boxes) for emphasis. For example, set off the report title from the body of the report by enclosing it in a box. Follow these steps to see how it changes the visual impact of a report:

1. **Give the title some more vertical space, to make room for the outlining box.**

   Expand the Report Header section: In Design view, drag down the lower border of the Report Header section about ¼ inch.

2. **Center the report title vertically in the Report Header section.**

3. **Switch to Preview mode. Then on the Insert Tools toolbar, click the Insert Box icon.**

   The cursor changes to a pencil.

4. **Draw a box around the title by clicking and holding over one corner, dragging diagonally to the opposite corner, and releasing the mouse button.**

   After you draw the box, you can format it.

5. **Click the box to select it; then right-click it and choose Format Box.**

   Format Editor appears, as shown in Figure 8-4.
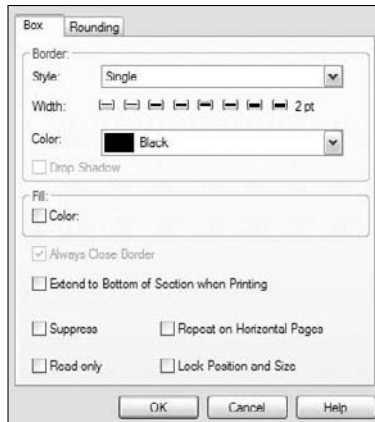
6. **From the Box tab, select a line thickness and a color (or other options, if you like).**

   I chose a medium thickness for the line and green as the color.

7. **(Optional) Click the Rounding tab, and then choose the amount of rounding.**

   Use settings on the Rounding tab to round the box corners to whatever extent you like, all the way from a rectangle to a circle. I selected a little bit of rounding (4%), as shown in Figure 8-5.

   See the result in Figure 8-6. It's a substantial improvement over the first version, which was created automatically by the Standard Report Creation Wizard.

Figure 8-5:
You can
change the
appearance
of the box.
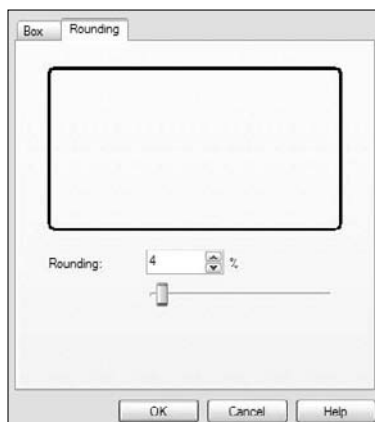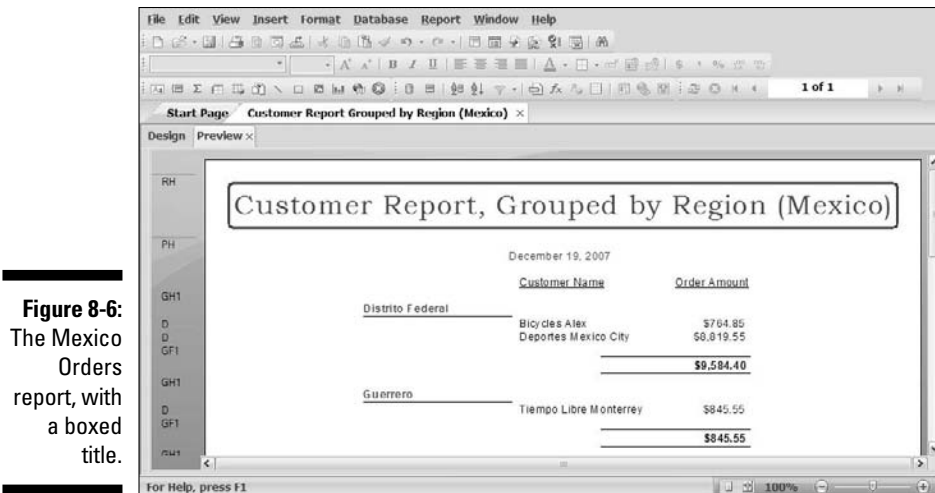
Figure 8-6:
The Mexico
Orders
report, with
a boxed
title.

Using absolute formatting fixes the format unless you change it via the Design tab or Format Editor. If you want different formatting, depending on the data that you're displaying, use the extensive conditional formatting capabilities of Crystals Reports, which I discuss next.

Conditional Formatting Using the Format Editor

In contrast to absolute formatting (which is fixed after you complete a report's design), you use *conditional formatting* to vary the appearance (or even the presence or absence) of a particular field, depending on the value contained in the field. From these choices, you get greater flexibility in how you can help your report's audience focus on relevant details.

For example, Xtreme (the company in the sample database used for this book) might want to draw attention to underperforming regions by coloring group totals red for all states or districts that have cumulative orders less than $2,000. A state might qualify for a red group total one month but (through additional sales) earn the right to a black group total the following month.

To demonstrate how to add conditional formatting to a report, use the Mexico Orders report from the preceding section and add the condition that group totals less than $2,000 should show as red rather than black.

1. **Switch to Design view.**

2. **In the Group Footer section, right-click the Sum of Orders.Order Amount field and choose Format Field from the contextual menu that appears.**

   Format Editor appears.

3. **Click the Font tab.**

   You can see that the default color is black, which is the color you want most of the time, but not this time.

4. **To add a condition for low order totals, click the Formula Editor button to the right of the Color menu.**

   The Format Formula Editor dialog box appears, as shown in Figure 8-7. Comments list the available color names.

Figure 8-7: Format Formula Editor, showing the formula that displays all totals of less than $2,000 in red.
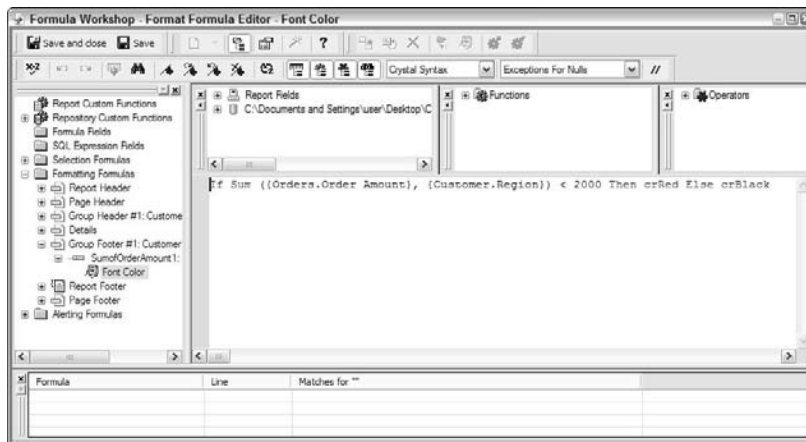
5. **Expand the Report Fields node in the first of the three panes above the work area, so the items shown in Figure 8-7 are visible.**

6. **Build the formula shown in Figure 8-7.**

   To do so, type the keyword **If**. Then double-click the Σ Group #1 line in the Report Fields node (in the upper-left pane above the work area). Complete the formula by typing the following:

   ```
   < 2000 Then Red Else Black
   ```

   The final formula should look like this:

   ```
   If Sum ({Orders.Order Amount}, {Customer.Region}) < 2000 Then crRed Else
           crBlack
   ```

7. **Click the Save and Close button in Format Formula Editor.**

8. **Click OK in Format Editor.**

Preview mode now displays the report in Figure 8-8. State totals of less than $2,000 are displayed in red, and all totals greater than $2,000 are shown in black.

Format Formula Editor is a powerful tool that you can use for creating complex conditions that govern what's shown on a report as well as how it prints. To maximize the capabilities of this editor, though, you need to know either the default formula-language syntax used in Crystal Reports or the BASIC language syntax. You can type a formula by hand or build it up by selecting fields, functions, and operators from the panes in the top half of the Editor.

There is, however, an easier way to get some of the features of Format Formula Editor — and without learning formula syntax: Use Highlighting Expert, coming up next.

Creating Emphasis with Highlighting Expert

Highlighting Expert is one of the easiest-to-use formatting tools in the Crystal Reports repertoire. Compared with Format Formula Expert, Highlighting Expert has limited flexibility, but you could use it instead of a formula to get

the same red group total in the preceding section. Here's a major difference to note: Highlighting Expert operates only on number and currency fields; Format Formula Editor works on any type of field.

To see Highlighting Expert in action, follow these steps:

1. **Click the Design tab of the Customer Report shown earlier in Figure 8-8.**

2. **In the Group Footer section, right-click the Sum of Orders.Order Amount field and choose Highlighting Expert from the contextual menu that appears.**

   The Highlighting Expert dialog box appears, as shown in Figure 8-9.
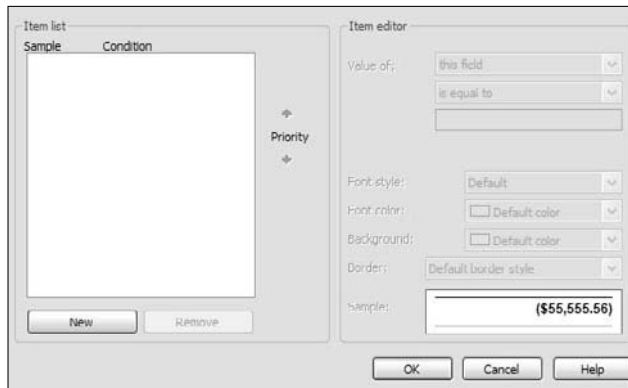
Figure 8-9: The Highlighting Expert dialog box.

You can change the font color, the background color, or the border of the selected item. For this example, put a single-line box around all state or district order totals equal to or greater than $5,000.

3. **Click the New button.**

4. **In the Value of This Field box, select *is greater than or equal to.* In the text box below Value of, enter** $5,000.00.

5. **In the Border box, select Single box.**

   The Highlighting Expert dialog box now appears, as shown in Figure 8-10.

6. **Click OK.**

   These settings produce the report shown in Figure 8-11. The total for Distrito Federal is enclosed in a box because its value is greater than $5,000. The other group totals are unchanged.

Figure 8-10:
Highlighting
Expert
dialog box
with
formatting
condition.
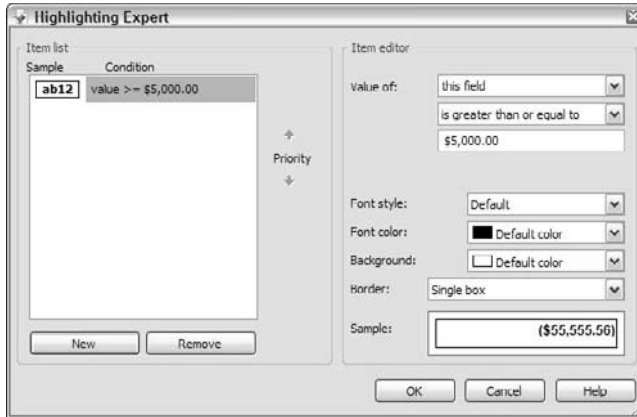
Figure 8-11:
Report
based on
modification
done with
Highlighting
Expert.
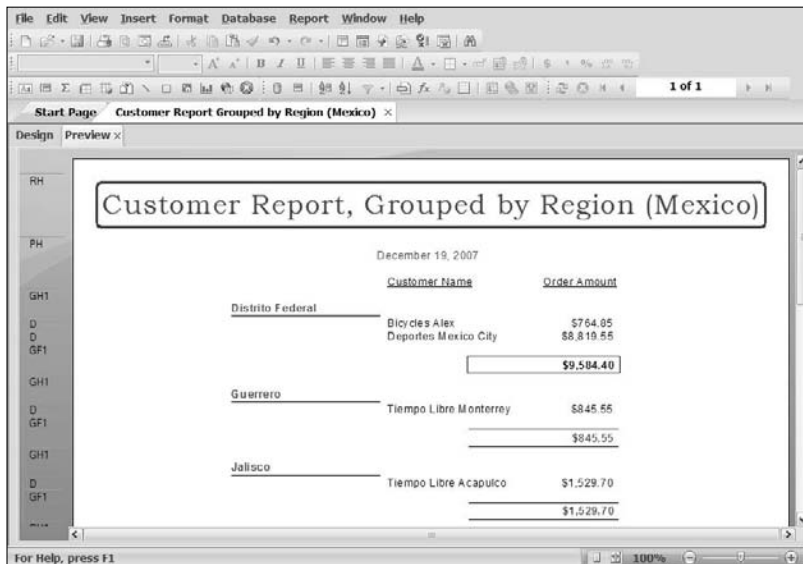
Adding Pictures to Your Report

You can add graphical images to a report to further enhance its visual appeal.
You can even add Flash animations. I cover Flash animations and the interactivity that is possible with them in Chapter 17. Here I stick to talking about
static pictures.

To add a picture — bitmapped graphic images — to your report, follow these steps:

1. **Make sure you have space where you want to place the image.**

   I'm putting a Mexican flag in the report header. Unfortunately, I didn't think of this earlier and filled the report header with the report title. This isn't a problem, though. I just change the title to a smaller font and then redraw the box around the title, freeing up space for the flag. (You can read how to change the box and reset the box size earlier in this chapter.)

2. **On the Insert Tools toolbar, click the Insert Picture icon.**

3. **From the dialog box that appears, select the appropriate image file.**

   On the report, a rectangle appears that you can move around with the mouse.

4. **Position the rectangle where you want the image to be located, and then click.**

   The image appears on the report. Figure 8-12 shows the result of placing a Mexican flag in the report. The flag image was a little too tall to fit in the report header, but when I released the mouse button, the report header expanded just enough to hold the image.

5. **Save the report as Customer Orders by State or District (Mexico).**

You now have a report fit for the eyes of a Vice President of Sales!
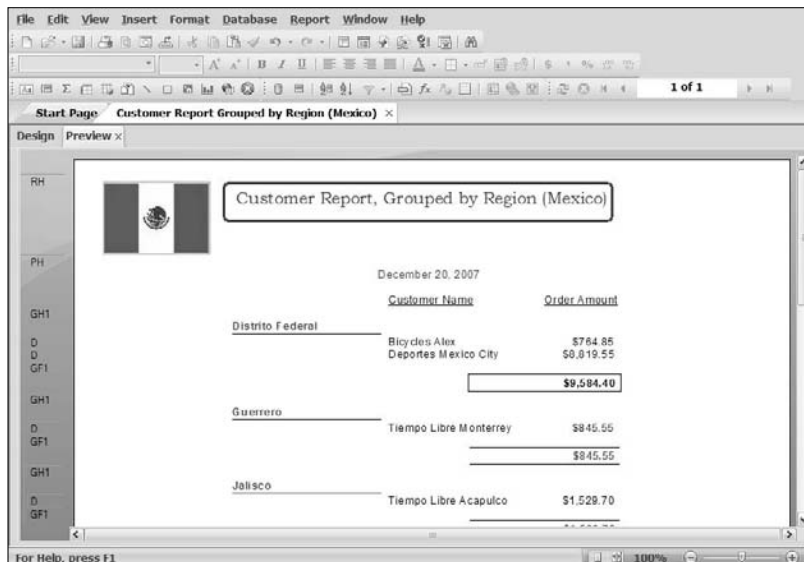
Figure 8-12:
The report includes a graphic image.

Aligning Preprinted Forms

Preprinted forms are designed to be filled out by hand or run through a sprocket-fed line printer. When using a laser or inkjet printer, it's devilishly hard to line up text with the lines and boxes on the form that are supposed to hold that text. Most people are more likely to have a laser or inkjet printer than a sprocket-fed printer these days, so alignment can be a problem.

Crystal Reports offers a clever solution to aligning text to preprinted forms. Because a report can have both text and graphical elements, and one can overlie the other, you can align text perfectly to a preprinted form by following a few simple steps involving a scanner:

1. **Scan the preprinted form and save it as a bitmapped file.**

2. **Place the scanned form in the Page Header section of the report as a bitmap.**

3. **Select the Underlay Following Sections option on Section Expert's Common tab.**

4. **Add text fields in the appropriate places of the Details section to line up with the form.**

5. **Both the form and the data print in one operation.**

Adding Text from a File

Crystal Reports is primarily designed to take data from a database, process it, format it, and then display it to the user. However, it can also display blocks of text from document files. You can control the formatting of the text block by sizing the text object that you insert it into.

To insert a block of text into a report, follow these steps:

1. **Insert a text object into the report at the location where you want the text to appear.**

2. **Right-click the object and choose Insert from File from the contextual menu that appears.**

   An Open dialog box appears, listing files in whatever directory was accessed last.

3. **Find the directory that has the file you want to insert.**

4. **Click Open.**

   The text file is transferred to the text object.

Formatting Options

Report developers can customize the development environment from settings available on the Options dialog box (see Figure 8-13).

To open this dialog box, just choose File➪Options The Options dialog box has eight tabs, with the Layout tab on top by default. As you can see in Figure 8-13, you can change many options, all of which amend what gets displayed and how. Most options are self-explanatory. Following is a quick rundown of each tab:

- ✔ **Layout:** Select what will be displayed on the work surface in both Design and Preview modes.
- ✔ **Database:** View system tables and any synonyms or stored procedures that the database has. You can look for approximate matches in table names, and decide how tables and fields are listed. The default values of the Advanced Options, as shown in Figure 8-14, are better left as they are unless you have a compelling reason to change them.
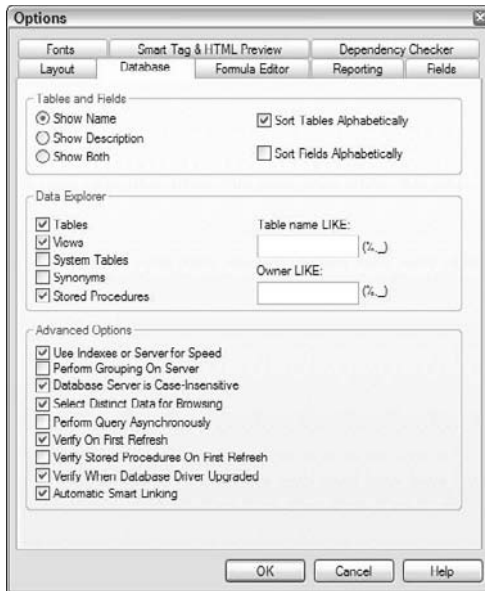
✓ **Formula Editor:** Customize the formatting options for the text you create with any of the editors, and specify some options for the Formula Editor.

✓ **Dependency Checker:** Decide whether to check formulas, expressions, custom functions and other items for syntax errors and validity.

✓ **Reporting:** Set a number of miscellaneous options.

✓ **Smart Tag & HTML Preview:** Define the Web server and viewing page you want to use when selecting Office smart tags for Crystal report objects.

✓ **Fonts:** Set default fonts for fields, charts, and text objects.

✓ **Fields:** Customize the formats of the various field types.

As you can read to this point, the broad array of Crystal Reports' formatting options gives you a lot of creative latitude for how your reports present information. Those options make your job of communicating much easier. However, Crystal Reports offers other modes of communication that are just as effective. One of the most powerful is Crystal Reports' charting capability, which is the subject of Chapter 15.

Special Fields Contain Report Metadata

Crystal Reports enables you to include report metadata within the report that the metadata is describing. *Metadata* is data about data, and *report metadata* is descriptive data about a report. For many kinds of reports, you might want to include metadata items in the report itself. For example, readers might want to know the date when the data in the report was last refreshed. They might want to know the name of the author of the report. You can display such things in your reports as special fields, which are accessible from the Special Fields list in Field Explorer. Well over a dozen special fields are available there, each one holding pertinent information about the report. You can drag them onto your report and drop them wherever you like.

Raising a Red Flag with Report Alerts

Sometimes the data in a report indicates a condition that requires urgent attention on the part of the report reader, but the urgency might not be readily apparent just from perusing the report. To make sure that the urgency gets across, Crystal Reports offers *Report Alerts,* which are custom messages that appear when certain conditions are met by data in the report. You can set a Report Alert to merely inform the reader of the condition, or specify a course of action to take.

Create a Report Alert by entering a formula, using the Formula Workshop. I discuss the Formula Workshop extensively in Chapter 10. In a Report Alert, the formula evaluates conditions that you specify. If the overall condition evaluates to TRUE, the alert is triggered, and its message is displayed. The message can be a text string, either by itself or combined with one or more report fields.

As an example, suppose that the Xtreme sales manager wants to be alerted whenever a customer in Mexico orders more than $5,000 of merchandise. A Report Alert added to the Customer Orders by State or District (Mexico) report will do the job. First, create the text of the alert. Then, set the condition that will trigger the alert.

Here's how to add the message itself:

1. **With the target report active, choose Report⇨Alerts from the main menu.**

2. **From the submenu that appears, click Create or Modify Alerts.**

   The Create Alerts dialog box appears, as shown in Figure 8-15. This dialog box lists alerts by name and tells whether they are enabled or disabled.
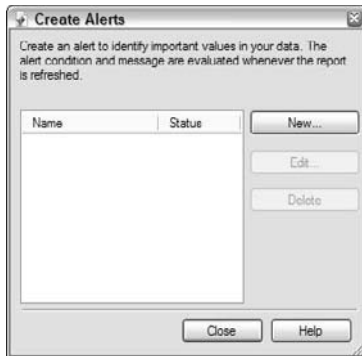
3. **Click the New button to display the Create Alert dialog box.**

   Note: This is not the same as the Create Alert*s* dialog box in Step 2.

4. **In the Name field of the Create Alert dialog box, enter** BonusTime**.**

5. **Click the Formula Editor button to the right of the Message Field to display the alert Message Formula Editor version of Formula Workshop.**

6. **From the Report Fields pane, drag Customer.Customer Name, and drop it in the upper-left corner of the formula area that fills the lower half of the Workshop.**

7. **Type a space, a plus sign, and then another space to the right of the Customer.Customer Name field in the formula area.**

8. **To the right of the plus sign and space, type the text string,** " has made a BIG order!"

   Note the blank space between the opening quote and the first word.

   Be sure to include the opening and closing double quotes in the string that you type. The formula should appear as shown in Figure 8-16.
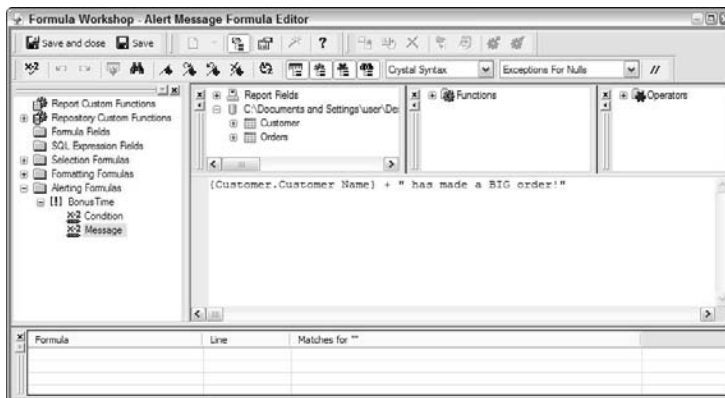
9. **Click the Save and Close button to return to the Create Alert dialog box.**

10. **In the Create Alert dialog box, click the Condition button.**

    The Alert Condition Formula Editor version of the Formula Workshop appears.

Now specify what condition must occur that will trigger the display of this Report Alert:

1. **From the Report Fields pane, drag the Orders.Order Amount field into the formula area and drop it in the upper-left corner.**

2. **In the Operators pane, expand the Comparisons node and drag the Greater Than operator down. Drop it just to the right of the Orders.Order Amount field.**

3. **To the right of the Greater Than symbol, type** 5000**.**

    This produces the formula shown in Figure 8-17.

4. **Click Save and Close to once again return to the Create Alert dialog box.**

5. **Ensure that the Enabled condition is selected (checked), and then click OK.**

    This puts your new Report Alert into the Create Alerts dialog box, as shown in Figure 8-18.

6. **Click the Close button to return to your report.**
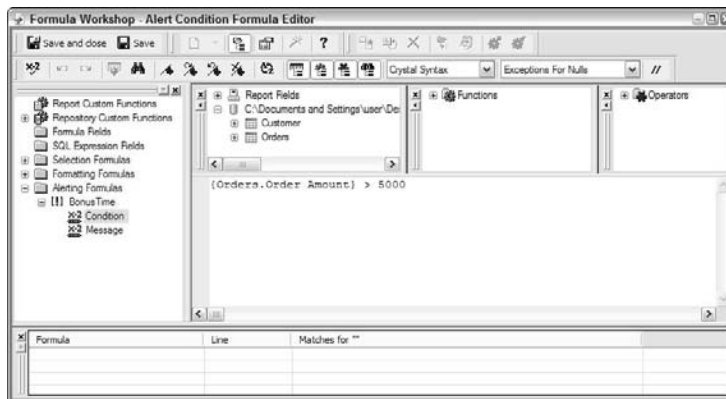
Figure 8-17:
Enter the condition formula to trigger the alert.

To see the Report Alert in action, just click the Refresh icon on the Standard toolbar. The Refresh Report Data dialog box pops up, asking you whether you really want to refresh the report data. And you do, so click OK.

If any customers have orders that exceed $5,000, now a Report Alert pops up to let you know. Figure 8-19 shows what one looks like.

To see exactly how big the order total is, click the View Records button in the Report Alerts dialog box.

Figure 8-19:
BonusTime
Report Alert,
showing a
customer
whose
order
exceeds
$5,000.
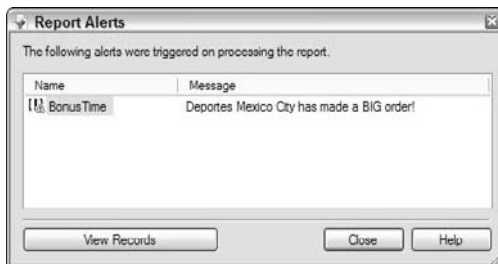
Using Report Templates to Save Time and Effort

Crystal Reports does indeed make report creation easy, but it still takes considerable thought and work on your part to design reports that are well proportioned, presented with an attractive choice of fonts, drawing elements, colors, and layout.

Considering the time that you invest to create one report, it would be nice if you could recycle your work to use in a similar report down the road. You save time and effort, while creating a visual consistency from one report to the next that conveys professionalism.

You can achieve that consistency and save that time and effort by using a report *template,* which is an existing report, complete with formatting, that you can use as a starting point for a new report that you create. You don't have to create the new report from scratch; you have to change only the things that are different between the template report and the new report you are creating. And sometimes you don't have to change anything.

Apply the template as the last step in your report creation process and *voilà!* You're finished, creating a polished, professional report in a fraction of the time it would normally take to create one.

Applying a template to a report

Here are the ways to apply a template to a report.

- ✔ **When creating a report:** Select a template from the Template view in the Standard Report Creation Wizard.
- ✔ **After you create a report:** Select a template, using the Template Expert.
- ✔ **Using an existing report:** Use it as a template for your new report. Using a report as a template adds it to your mental list of available templates for possible use in the future.
- ✔ **Creating a report specifically as a template:** It can serve as a pre-formatted skeleton for a variety of reports.

Applying a template to an existing report

Applying a template to an already existing report is easy. To see just how easy, look again at the Big Orders report from Chapter 5; see Figure 5-17 (with a $5,000 lower limit) and again here in Figure 8-20 (with a $9,000 lower limit).

It looks pretty plain, but you can spruce it up with one of the Crystal Reports standard templates. Here's how:

1. **Click the Template Expert icon on the Expert Tools toolbar.**

   The Template Expert, as shown in Figure 8-21, opens.

Figure 8-20:
Big Orders
report, run
with a
$9,000 lower
limit.
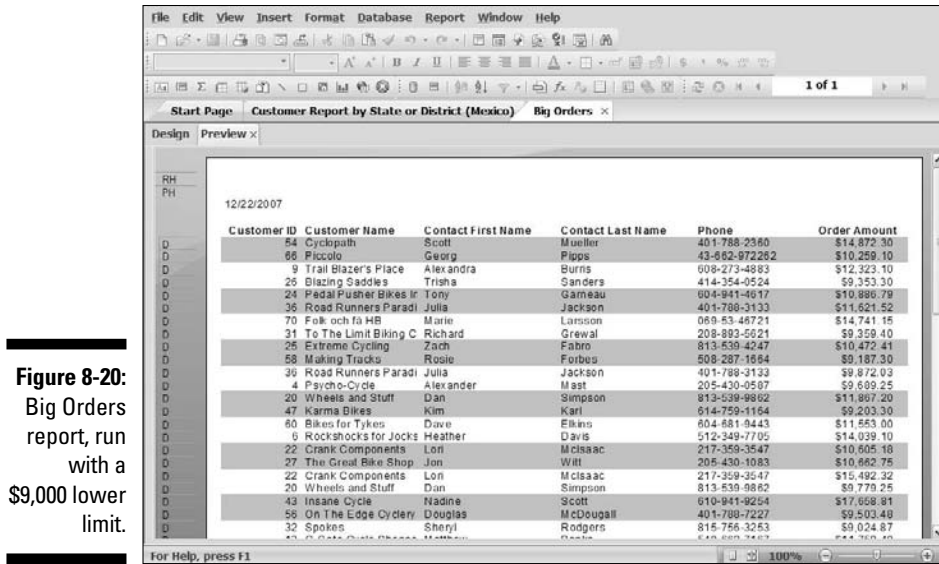
Figure 8-21:
Template
Expert
dialog box,
before a
template is
selected.
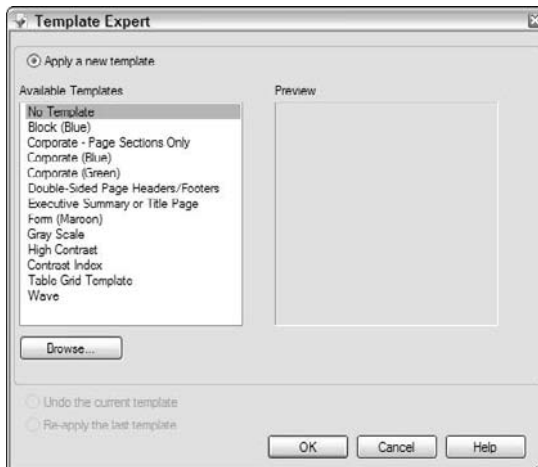
2. From the Available Templates pane, select Block (Blue), then click OK.

The Template Expert disappears. After a few seconds, the Block formatting is applied to your report. In this example, the result looks like Figure 8-22.

Figure 8-22:
Big Orders
report with
Block (Blue)
formatting
applied.

In this case, the template's headings override the original headings. (The detail rows are unchanged.) And if the formatting that the template gives you is close to what you want but not exactly perfect, change to Design view and make the changes you want. For starters, you probably want to replace the Business Objects logo in the page header with your own logo.

REMEMBER

Any template alterations you make are much less work than setting all your formatting from scratch.

When you're finished tweaking, save this report with the name Big Orders with Template.

Applying a template to a report you're creating

When you create a report with the Standard Report Creation Wizard, the wizard steps you through a series of views. We have already seen several of these. Below is a complete list, the last of which is Template view.

- **Data:** Select tables to include in your report.
- **Links:** If you're including more than one table, specify here how the tables are linked.

- ✔ **Fields:** Specify which fields from the selected tables you're going to use.

- ✔ **Grouping:** Separate records into groups in the report (for example, grouping customers by country).

- ✔ **Summaries:** Specify any summaries that you want to include in the report, such as totals or averages of numerical data.

- ✔ **Group Sorting:** Specify the order in which you want groups sorted.

- ✔ **Chart view:** Specify what kind of chart you want to create to give a graphical representation of your data.

- ✔ **Record Selection:** Filter out records that you don't want.

- ✔ **Template:** Choose this from the Template view of the Standard Report Creation Wizard. This wizard, as shown in Figure 8-23, looks very similar to the Template Expert shown in Figure 8-21. They resemble each other because they serve similar purposes.

If some of the preceding listed views aren't relevant, they don't appear, depending on the choices you make as you progress through the wizard.

Figure 8-23: Template view of the Standard Report Creation Wizard, showing the templates available.
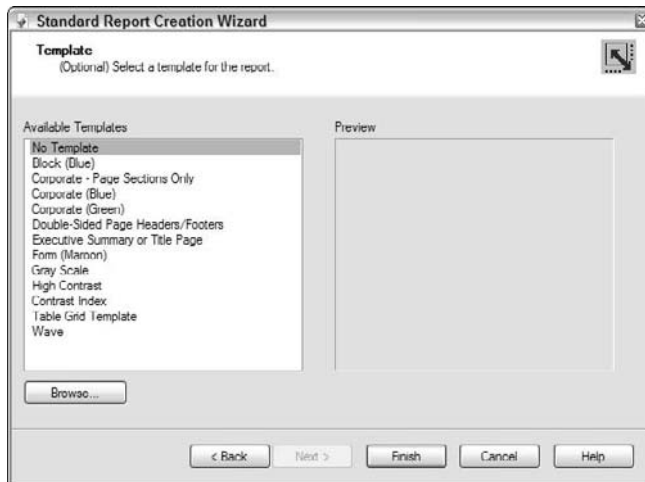
Part III

Advanced Report Types and Features

The 5th Wave   By Rich Tennant
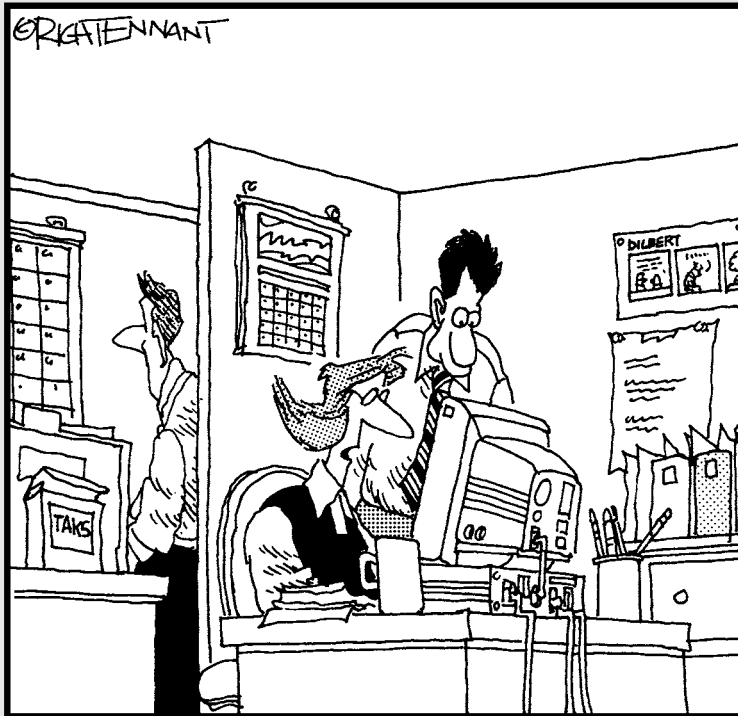
"My report on inventory management will include a video clip from rottingmeat.com."

In this part . . .

This part introduces you to the major leagues of report creation. With the knowledge you gain here, you'll be able to produce reports that are the ultimate in sophistication. You uncover ways to select the data that your report will include and sort it for maximum understandability. You make reports that use formulas and almost think for themselves. Cross-tab reports expose correlations in your data. OLE enables you to include data from nontraditional data sources. OLAP introduces you to multidimensional reporting. Charts and graphs tell your story in a way that words can't express.

Chapter 9

Displaying Your Top Ten (Or Top N) with Group Sort

In This Chapter

▶ Sorting groups by performance rather than by name

▶ Selecting by percentage

▶ Sorting groups in reverse

▶ Troubleshooting problems with group sorts

*A*n old saying in the sales business is that you get 80 percent of your sales from 20 percent of your customers. It's called the Pareto Principle, or the 80/20 rule, and it's not restricted to sales. When doing the same work, some people or things are more productive than others. If you identify the most productive salespeople, machinery, or whatever, you can analyze the factors that make them so effective and perhaps apply what you learn to increase productivity overall.

In Chapter 6, I cover how to sort records and group them. A valuable extension of these capabilities is producing a report that shows only the top producers. In this chapter, you find out how to do just that.

Sorting Groups Based on Performance

In Chapter 6, I discuss the creation of a report for Xtreme Mountain Bikes that shows the dollar totals of individual sales orders, sorts the orders by customer name, groups records by state, and sorts the groups by state. That report, however, isn't very helpful to the Vice President of Sales, who is trying to get a feel for which customers are buying the most.

Adding *drill-down* capability to the report (as you can see in Chapter 6) shows which states are responsible for the most sales (on a percentage basis) but doesn't show which customers are the best. To get the information you want, in the form that's easiest to understand, a Top N report is probably your best choice. If you're interested in finding out more about your top five customers, then N equals 5. If you want to know about the top ten, then N equals 10.

Starting a Top N Report

To build a Top N Report, follow these steps:

1. **Select Report Wizard from the list of options on the Start Page.**

   A blank report appears on the workspace, and Database Expert gives you the opportunity to connect to a data source.

2. **Connect to the `xtreme.mdb` database, and then select the Customer and Orders tables, as shown in Figure 9-1.**

   If Steps 1 and 2 are Γρεεκ (Greek) to you, hop to Chapters 2 and 4 for how to do these basic tasks.

Figure 9-1: Customer and Orders tables selected from Standard Report Creation Wizard.

3. **Click Next to display Link view.**

   You see the Customer table connected to the Orders table by the Customer ID field.

4. **Click Next to display Fields view.**

5. **Move Customer Name, Region, and Order Amount to the Fields to Display pane.**

6. **Click Next to display Grouping view.**

   The Vice President of Sales wants to list the five top U.S. customers, along with their states and the total amount of their orders. The easy way to do this is to group the records by Customer ID, hide order detail, sort by the sum of the order amount for each customer, and include the top five customers in the report.

7. **Move Customer.Customer Name to the Group By pane and specify descending order.**

   This puts the customer with the highest total first.

8. **Click Next to display Summaries view.**

   In the Summarized Fields pane, Crystal Reports infers that you want to summarize Sum of Orders.Order Amount. It is the only field of the three that you specified as numeric. It also infers that the specific type of summary you want is a Sum.

9. **Click Next to display Group Sorting view, which is shown in Figure 9-2.**

Figure 9-2: Group Sorting view, showing the Top 5 Groups option.

10. **Select the Top 5 Groups radio button.**

    In the Comparing Summary Values for the Top or Bottom Groups pull-down list, Crystal Reports has selected Sum of Orders.Order Amount for you.

11. **Click Next to display Chart view, and then click Next again to display Record Selection view.**

12. **You're interested in only U.S. sales at present. Move Customer.Country from the Available Fields pane to the Filter Fields pane. In the drop-down menus below the Filter Fields pane, select *is equal to* and USA.**

    Figure 9-3 shows Record Selection view filled out.

13. **Click Next to display Template view.**

14. **Select a template for the report.**

    To follow along with the example, select the Block (Blue) template. (I cover templates in Chapter 8.)

15. **Click Finish.**

    Crystal Reports builds your report and it appears onscreen, as shown in Figure 9-4.

It's not exactly what the Vice President of Sales had in mind. You need to make the following adjustments:

- ✔ Delete the Business Objects logo, which appears at the top of every page.
- ✔ Give the report a title.
- ✔ Change the Region column heading to State, and center the state data under it.
- ✔ Space the columns horizontally.
- ✔ Delete the repeated customer name entries in the detail lines.
- ✔ Hide the individual entries for each order.
- ✔ Display the sum of the orders for each displayed customer.

Figure 9-4:
The Top
Five USA
Customers
report, as
created by
Standard
Report
Creation
Wizard.
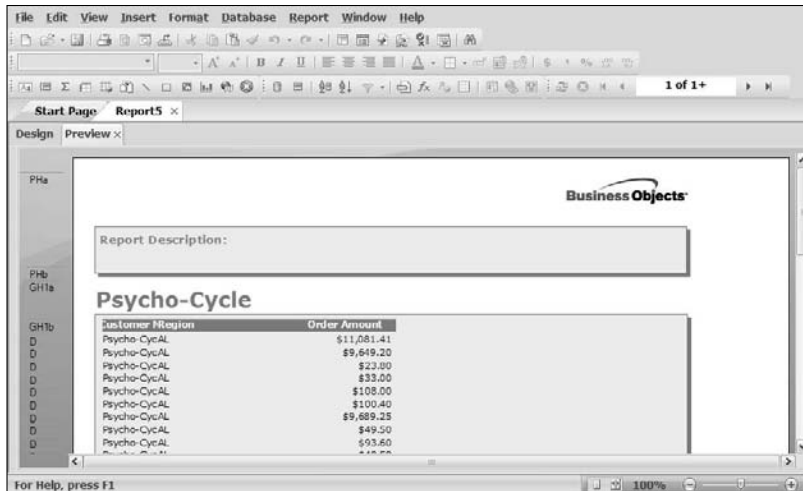
To make the needed adjustments, follow these steps:

1. **Switch to Design mode.**

2. **Right-click the Business Objects logo in the page header and choose Cut from the contextual menu that appears.**

   In the Page Header section PHa, an area has been set aside for the report title. If you're wondering about PHa: In this template, the Page Header is subdivided into two sections, labeled PHa and PHb.

3. **Drop a text box onto the report title area in the page header.**

4. **Type** Top Five USA Customers **inside the newly placed text field.**

5. **Center the text and increase its font size to 22 to make the heading easier to read.**

6. **In the Report Description text object, after the words *Report Description,* type** The Top Five USA Customers**. Expand the text box to the right to accommodate the entire description.**

   Things are going well.

7. **Change the Region column heading to State and center the two-character state abbreviations below it.**

   Make the change to the column heading in group header GHb. To center the state abbreviation, click the Region field in the Details section, and then click the Align Center icon on the Formatting toolbar.

8. **Spread out the group headers and details columns for State and Order Amount on the page, while eliminating the Customer Name column.**

   Because the customer name appears in the group header, you don't need to repeat it in the Details area.

   At this point, the report looks like Figure 9-5.
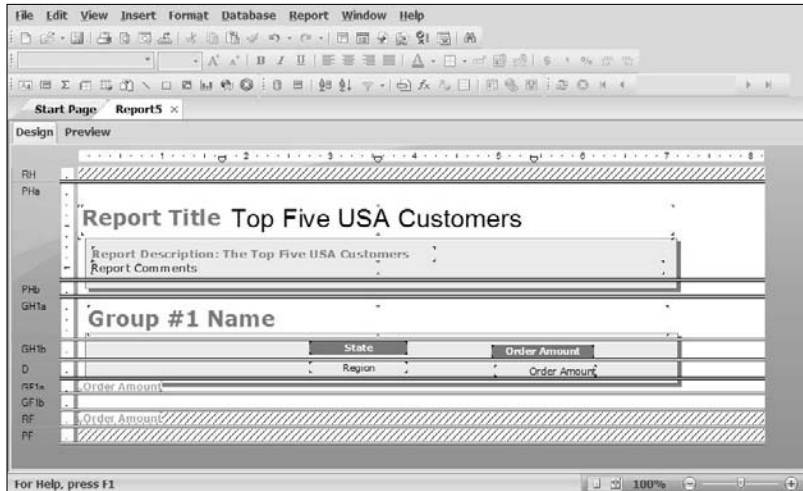
Displaying a group total

The next thing to do is display a group total in the Group Footer section:

1. **Pull down the lower boundary of the shaded rectangle drawing object from GF1a (Group Footer) to GF1b.**

   This enables you to put a group sum into the GF1a space. Note the grayed-out field at the left edge of the GF1a section. This is the sum field for the group named Sum of Orders.Order Amount. It is grayed out because it is currently suppressed.

2. **Right-click the Sum of Orders.Order Amount field in GF1a. From the contextual menu that opens, choose Format Field.**

   The Format Editor dialog box appears, with the Number tab selected.

3. **Click the Common tab (see Figure 9-6).**
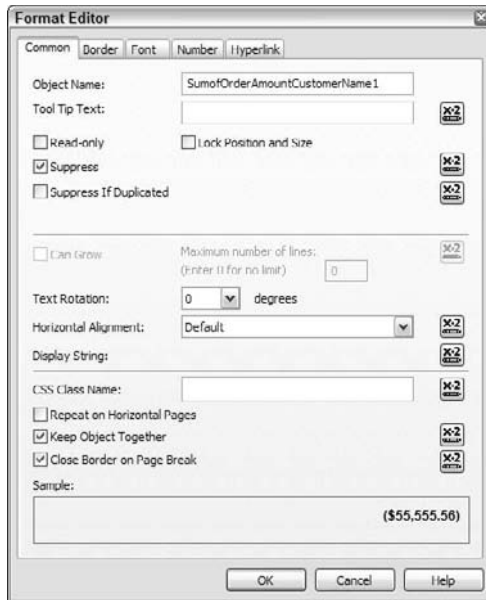
Figure 9-6:
The
Common
tab of
Format
Editor.

4. **Clear the Suppress option (uncheck it) and then click OK.**

   The Sum of Orders.Order Amount field is fully visible.

5. **Move the Sum of Orders.Order Amount field to the right so that it lines up directly beneath the Order Amount column.**

6. **Switch to Preview mode.**

   Crystal Reports displays the Sum field in the appropriate place in the GF1a section, below the Order Amount heading.

Hiding the details

The next thing you might want to do to produce a summary report for a top executive is to hide all the detail lines:

1. **Right-click the area to the right of the Details section and choose Hide (Drill-Down OK).**

   The report now looks like Figure 9-7. This is still not quite what you want. The customer name is bigger and bolder than it needs to be for a one-line entry. The state information has been hidden, and you still have only one customer per page. These defects are easy to correct.
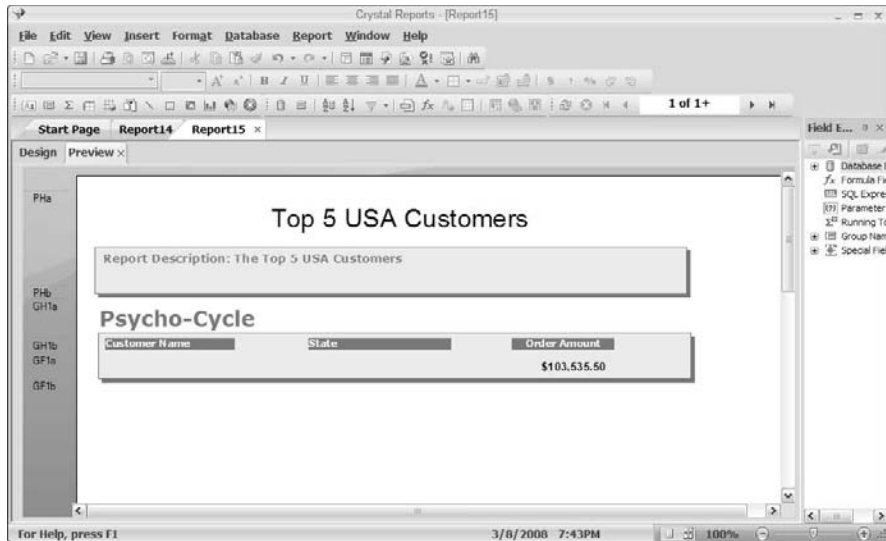
Figure 9-7:
Report with
details
hidden.

2. **Click the Insert Summary icon.**

   The Insert Summary dialog box appears.

3. **Make the selections shown in Figure 9-8.**

   These selections are as follows:

   a. *Summarize the Customer.Customer Name field.*

   b. *Use the Maximum summary operator.*

   c. *Choose Group #1 for the summary location.*

   Crystal Reports automatically places the Customer Name field in the appropriate place in the GF1a section, below the Customer Name heading. You might have to move the summary to line it up with the template and with the numerical sum on the right side of the report.

4. **Repeat Step 3 for the Customer.Region field to insert it below the State heading.**

5. **With the Region still selected, click the Align Center icon to center the state abbreviation below the State heading.**

6. **Delete the Customer.Customer Name field from GH1a.**

   This leaves each group with all the information you want and none of the extra stuff you don't want to display.

Removing page breaks

Now all you have to do is remove the page breaks between groups. The page breaks were set by a formula in the Group Footer #1 specification. To delete the formula, follow these steps:

1. **Right-click the area to the left of the GF1a section and choose Section Expert.**

   From the context menu, choose Section Expert. The Section Expert dialog box appears, as shown in Figure 9-9. Group Footer #1a is selected.

2. **Move the Group Footer #1a selection up one row to Group Footer #1, and switch to the Paging tab in the pane on the right.**

   Note that for the Group Footer #1 section, the New Page After check box is selected. A color change in the formula icon for that selection indicates that this action is controlled by a formula. Blue has turned to red.

3. **Click the Format Editor icon.**

   Format Formula Editor appears, as shown in Figure 9-10.
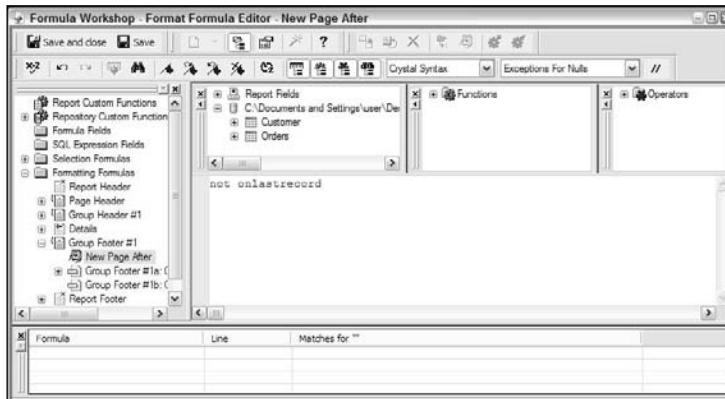
Figure 9-10: You want to delete this formula.

4. **Delete the `not onlastrecord` formula (in the formula area).**

   Deleting this formula just keeps things clean and tidy. It has no effect after Step 6.

5. **Click the Save and Close icon.**

6. **Back in Section Expert, clear the New Page After check box and then click OK.**

   This gives you the five top customers, their states, and the amount each has purchased, as shown in Figure 9-11.

7. **Save this report as `Top5USAfinal.rpt`.**
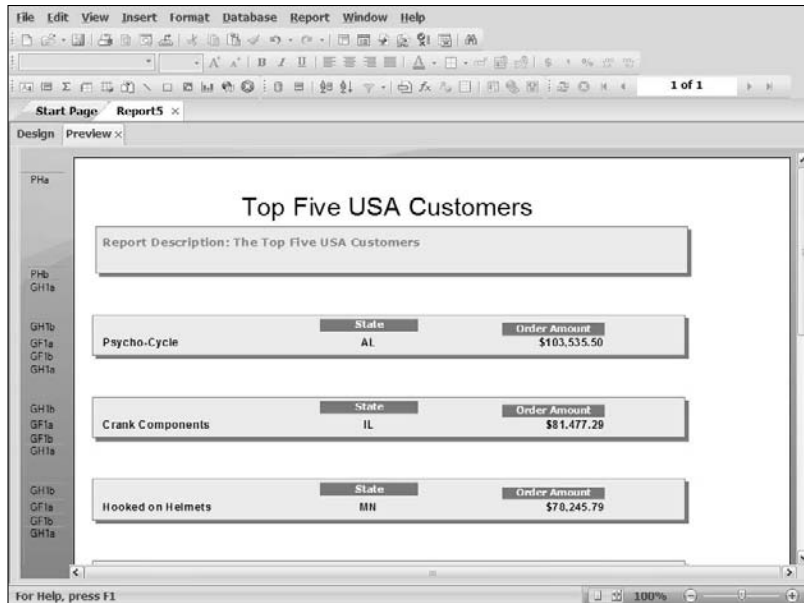
Figure 9-11:
The
completed
report.

Summary fields do more than just compute sums

Crystal Reports offers a number of different summarizations in addition to simple sums such as the one I discuss here. When you click the Summarization icon (the capital sigma, Σ), the Insert Summary dialog box appears, as shown in the following figure. Available summary functions appear in the pull-down list, some of which you might want to use, depending on your application.

For numeric fields, the summary options are as follows: Sum; Average; Sample Variance; Sample Standard Deviation; Maximum; Minimum; Count; Distinct Count; Correlation With; Covariance With; Median; Mode; Nth Largest; Nth Smallest; Nth Most Frequent; Pth Percentile; Population Variance; Population Standard Deviation; and Weighted Average With.

For text fields, you choose from a smaller range of possibilities: Maximum; Minimum; Count; Distinct Count; Mode; Nth Largest; Nth Smallest; Nth Most Frequent.

These choices give you just about any type of summary you'd ever want.

Going with the Percentages

Sometimes it's more helpful to know who is responsible for the largest *percentage* of an organization's total sales rather than the specific dollar amount. The Group Sorting screen of the Standard Report Creation Wizard handles summaries expressed as percentages as well as straight numbers. You could build a report from scratch (similar to the one in the preceding section) by following most of the same steps, with just a slight difference at the summarization step.

Rather than going through all that again here, though, just modify the completed report (refer to Figure 9-11) to display percentages rather than group totals. Just follow these steps:

1. **In Design mode, right-click the Sum of Orders.Order Amount field in the Group Footer #1a section.**

   The menu shown in Figure 9-12 appears.
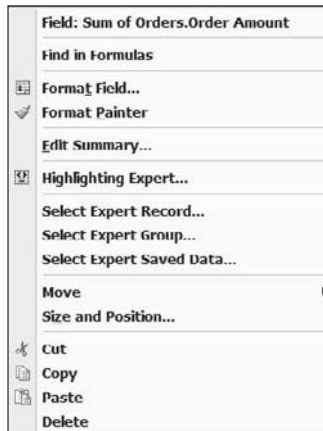
Figure 9-12:
Menu for
Orders.
Order
Amount
field.

2. **Choose Edit Summary.**
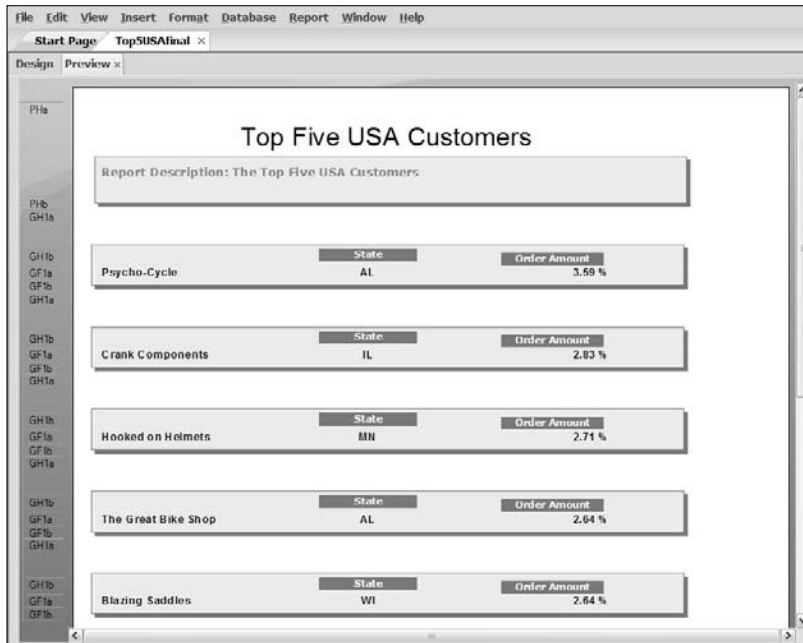
   The Edit Summary dialog box appears.

3. **Select the Orders.Order Amount field to summarize; calculate the Sum summary, and select the box to the left of Show as a Percentage Of.**

   The drop-down list below the Show as Percentage Of line holds the value you want (Grand Total: Sum of Order Amount).

4. **Click OK.**

Now when you switch to Preview mode, you see the report shown in Figure 9-13. The five top customers are listed along with their percentage of Xtreme's total sales. This report tells you something that you didn't get from the previous report: The top five customers combined, account for less than 15 percent of Xtreme's orders. Looks like Xtreme is in the healthy position of not depending too much on a small number of customers. Sales volume is distributed over a large customer base.

Figure 9-13:
This report shows the top customers' percentage of Xtreme's total orders.

What if you want the top 17 instead of the top 5?

The group sort used here to produce the latest reports happened to ask for the top five customers. Okay, that's suspiciously convenient; the Standard Report Creation Wizard gives you the option of selecting the top 5 or bottom 5 — but not the top 10, top 17, and so on. If you want your report to return some number of groups other than five, use Group Sort Expert.

Click the Group Sort Expert icon, on the Expert Tools toolbar, to open the Group Sort Expert dialog box, as shown in Figure 9-14.

Figure 9-14:
You can sort
in several
ways.

The default values for the current report are shown. The type of sort is Top N, based on Sum of Orders.Order Amount, where N is 5. If you want to see the percentage sales of the top 17 customers instead of the top 5, just replace the 5 with a 17 in the Where N Is field, and then click OK. The only task that remains to make this a complete report is to change the references to *Five* in the page header to *Seventeen.* Figure 9-15 shows the result.
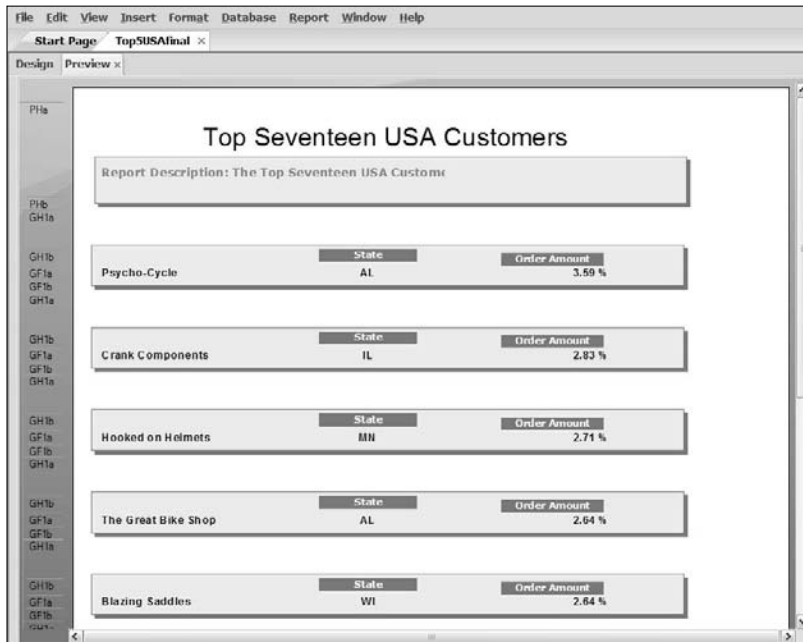
Figure 9-15:
Top
Seventeen
report.

Hmmm. Maybe you're not finished after all. Now the report extends over two pages, and it seems redundant to repeat column headings above each customer line. Also, the space between records is excessive. You can tighten up the report as follows:

1. **In Design mode, right-click the area to the left of PHb (page header) and choose Insert Section Below from the contextual menu that appears.**

   One way to tighten up your report is to move the column headings from the Group Heading section to the Page Heading section. This means you have to expand the Page Heading section by adding a new subsection — in this case, PHc.

2. **Drag the column headings up from GH1b to PHc, placing them at the top of the PHc space.**

3. **Drag the bottom of the section up to the bottom of the column headings.**

4. **Drag the bottom of the shaded box Drawing Object (that provides the background color) down into the Page Footer section.**

5. **Drag the top of the box down to the bottom of the GHb section.**

6. **Right-click the area to the left of Group Header a to display a contextual menu, and then use it to suppress GHa.**

   This eliminates GHa, which is doing nothing but taking up space. At this point, the report looks like Figure 9-16.

7. **Save the report as Top17USA.**

Figure 9-16: The revised Top Seventeen report.

A Choice of Group Sorts

If you've read this chapter to this point, you can probably guess (from what you have seen so far) that everything you can do for the top performers, you can also do for the bottom performers. Take a closer look at the Group Sort Expert dialog box. Figure 9-17 shows it with the group sort list pulled down. The options on this menu are No Sort, All, Top N, Bottom N, Top Percentage, and Bottom Percentage.

Figure 9-17:
Group Sort
Expert
dialog box,
showing
group
sort list.
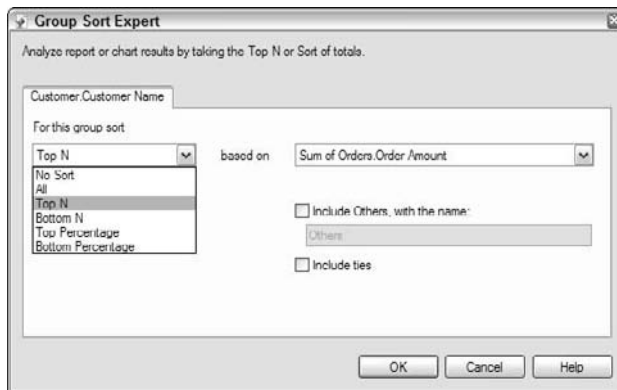
I explain earlier what choosing Top N does. Choosing Bottom N does the same thing, just for the tail-enders rather than the leaders. The other four options require a little explanation.

✔ **No Sort:** Using the No Sort option does what it says: nothing. It leaves the lines of the report in the order in which the corresponding groups appear in the database. You might wonder why this option even exists. Maybe you want to build a new report based on an existing one, but the existing report is sorted. If you want your new report to reflect the order of the records in the database rather than the sort order of the old report, one way to get what you want is to use the No Sort option.

✔ **All:** Using the All option sorts and displays all the groups, not restricting the display to any given number. A report built according to this option contains all the data of a Top N report, plus all the data of a Bottom N report, plus data on all the groups not included in either of those.

✔ **Top Percentage:** When using a Top Percentage group sort, you specify the top percentage that you want to see in the report. For example, if you want to see whether the 80/20 rule applies to your organization, specify a Top Percentage group sort, and enter **80** in the Where Percentage Is box. For example, if you have 90 customers, the 80/20 rule holds if the report lists about 18 customers (representing 20 percent of the total).

✔ **Bottom Percentage:** To report on the customers who order the least amount of product, use the Bottom Percentage group sort. For Xtreme Mountain Bikes, the companies in this report need help or should be replaced by companies that can do a better job.

Troubleshooting Group Sort Problems

Because Group Sort Expert walks you through the process of sorting and summarizing group data, there aren't many ways for you to get into trouble. However, here are a few things to keep in mind when adding group-sort capability to a report:

✔ **You can't perform a Top N, a Bottom N, or other type of group sort unless your report contains a summary value.** If you have trouble creating a Top N or a Bottom N report, make sure that the sort is based on a summary value.

✔ **Creating a subtotal for a group might not work if the report data is drawn from tables linked in a one-to-many relationship.** For such a case, you might have to use a running total instead of a subtotal. If you're not getting the summary values you want and your report is drawing data from multiple tables, check whether the tables have a one-to-many relationship. If such a relationship exists, try using a running total rather than a subtotal for each group. (Chapter 6 explains the use of running totals.)

What's a one-to-many relationship, you ask? It's a relationship between two database tables where one record in the first table corresponds to multiple records in the second table. For example, the relationship between the CUSTOMER table and the ORDERS table is one to many. One customer can make multiple orders, but each order is made by one and only one customer.

✔ **Watch out for invisible objects.** Sometimes, you'll want to shrink the size of a section by dragging up its lower boundary. If you find that the section will shrink only so much and no more, an invisible object might be in the section. You can't shrink a section past the border of an object that the section contains, even if you can't see the object. Check carefully to see whether the border of a drawing object or an empty text object is hidden under the boundary line that you're trying to drag up. When you drag your mouse over a hidden object, its border line appears. This is your clue that the object exists. Once you know it is there, you can delete it.

Chapter 10

Adding Formulas to Reports

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*Y*ou can create a report by dragging database fields onto a blank report, adding text and images, and performing a variety of summaries. Such reports are fine for many applications, but sometimes you want to do more than merely summarize data. You might want to process it in some way before displaying it. Crystal Reports has a formula capability that gives you much more latitude in creating the report you want. If you're already a programmer, using formulas won't be tough. If you're not a programmer, you might be surprised to see how soon you can do useful things with formulas. Formulas enable you to perform arithmetic, logical, and string manipulation operations on your data. Using formulas, you can present in your report the information you want your readers to see, even if it's not present in the proper form in your database.

In this chapter, I show you how to use formulas to massage raw data into a presentable form. Crystal Reports includes a number of built-in functions that you can include in your formulas to speed your development efforts. In addition to the built-in functions, you can create your own custom functions to perform operations that are a little out of the ordinary.

Formula Overview and Syntax

You can use formulas in a number of ways.

One common use of a formula is to perform a calculation that modifies the contents of a database field. Suppose you have a database table named

Product that holds data (including price) on all the products you sell. To calculate a 10-percent discount from your normal price, you could use a formula such as this:

```
{Product.Price} * .9
```

Formulas follow one of two Crystal Reports syntaxes, either one of which you can use to write them. The two syntaxes are equivalent, so you can use which-ever you find easier. The preceding formula (for example), written with BASIC syntax, looks like this:

```
formula = {Product.Price} * .9
```

Crystal Reports Basic syntax is similar to Visual Basic syntax. If you're a Visual Basic programmer, you might be most comfortable using BASIC syntax — and it'll work. If you're not particularly biased toward Visual Basic, you might prefer to use Crystal Reports syntax (unchanged since the early versions of the product). Although Crystal Reports syntax can do a few things that BASIC syntax can't, neither has a universal advantage over the other. In the example formulas in this book, I use Crystal Reports syntax.

In this chapter, I throw at you a number of new words. Here are some simple definitions to help you understand how these terms are used in a program-ming context.

- ✔ **Formula:** Any legal combination of symbols that represents a value.
- ✔ **Function:** A section of a formula that performs a specific task.
- ✔ **Operator:** A symbol that represents a specific action. For example, the (+) sign is the operator for the addition operation.
- ✔ **Parameter:** A variable that is passed to a function.
- ✔ **Argument:** A parameter.
- ✔ **Clause:** A subsection of a formula.
- ✔ **Variable:** A symbol or name that stands for a value.
- ✔ **Data type:** Classification of a particular type of data. Different data types include Date, Integer, and Character.

Lessening the Workload with Functions

Crystal Reports has a number of predefined *functions,* which you can include in formulas to reduce the size and complexity of the formula code that you have to write yourself. For example, suppose that you have a database application with a data entry form in which users enter a customer's name and address

information. In the Region field, users are supposed to enter an uppercase, two-letter state or province code. If the user accidentally fails to use uppercase, the following Crystal Reports UpperCase function corrects that problem:

```
UpperCase ({Customer.Region})
```

This formula converts whatever is in the Region field of the Customer table to uppercase. As you can see, the argument of the function is enclosed in parentheses. The combination of the UpperCase function and its argument {Customer.Region} constitutes a formula. If the contents are already in uppercase, no change occurs. If any of the letters are lowercase, though, they're changed to uppercase. When you use this function, you don't have to bother checking the case of an entry, and then correcting it if necessary. I discuss functions in greater detail when I talk about the Formula Editor component of Formula Workshop, later in this chapter.

Creating a Custom Function in Formula Workshop

After you have a report open in Crystal Reports, you can access Formula Workshop from the Expert Tools toolbar. When you click the Formula Workshop icon, the screen shown in Figure 10-1 is displayed.

The Workshop tree in the left pane of Formula Workshop displays several folders: Report Custom Functions, Repository Custom Functions, Formula Fields, SQL Expression Fields, Selection Formulas, and Formatting Formulas. I discuss most of these options later in this chapter.

Figure 10-1: The main categories of functions and formulas for inclusion in your report.
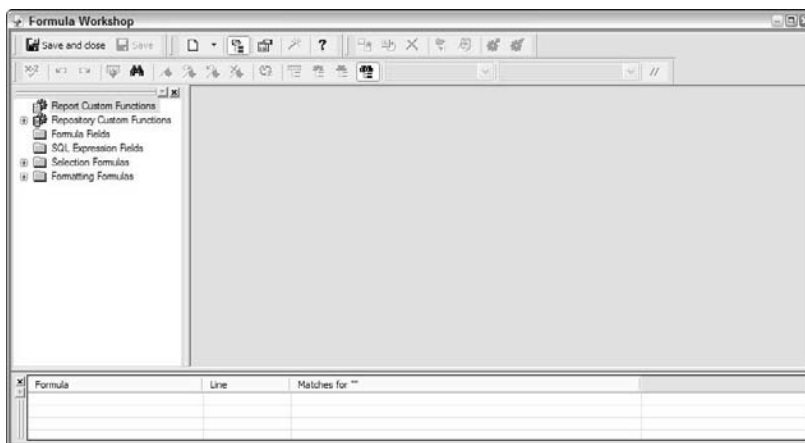
After you create a formula, you can give it a name and save it as a custom function. You can then use the custom function again in the same report or in other reports.

To create a custom function, follow these steps:

1. Open the report where you want to use the function.

To follow along with this example, open the `Top5USAfinal.rpt` report file from Chapter 9.

2. On the Expert Tools toolbar, click the Formula Workshop icon to open Formula Workshop.

3. Right-click the Report Custom Functions branch on the Workshop tree and choose New from the contextual menu that appears.

The Custom Function Name dialog box appears, asking you to enter a name for the custom function you are about to create.

4. Enter a meaningful function name.

I named this function `ConcatWith1Space`. You'll use this function to *concatenate* (combine) a customer contact's first and last name, with one blank space in between.

5. Click the Use Editor button.

The Custom Function Editor appears, as shown in Figure 10-2. In the center are the Functions pane (with various predefined functions that you can include in your custom function) and the Operators pane. You use *operators* to combine function elements or operate on function elements. You can also find a collection of predefined functions in the Functions pane on the left and an array of operators in the Operators pane on the right.

Figure 10-2:
Custom
Function
Editor is
waiting
for you to
specify
what the
function
will do.
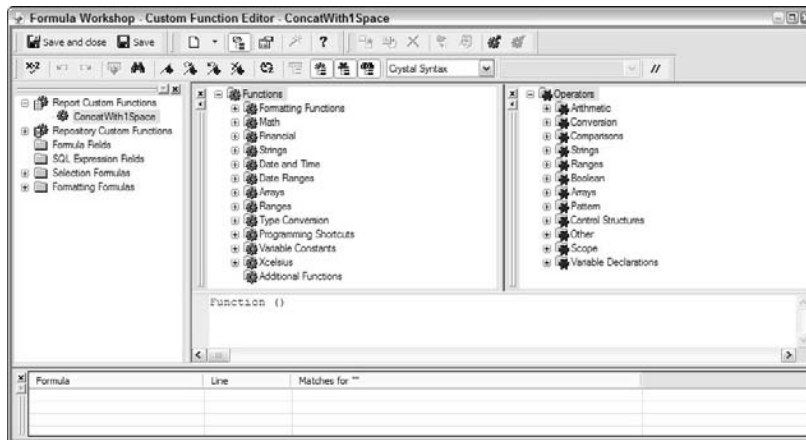
6. **If they're not already displayed, expand the Functions and Operators nodes to see the functions and operators.**

   Figure 10-3 shows the Functions and Operators panes with the main nodes expanded.

Figure 10-3: Functions and Operators panes now show categories of functions and operators.
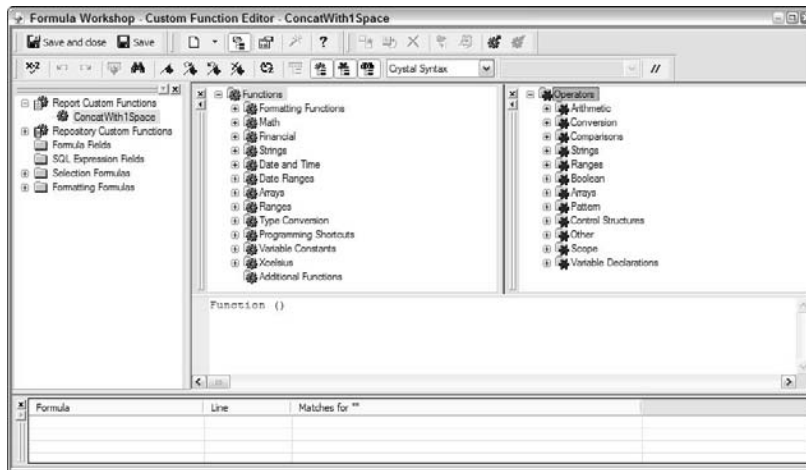
As you can see, there are quite a few different types of functions and of operators.

Function types are

Formatting Functions	Math
Financial	Strings
Date and Time	Arrays
Ranges	Type Conversion
Programming Shortcuts	Variable Constants
Xcelsius	Additional Functions

Available types of operators are

Arithmetic	Conversion
Comparisons	Strings
Ranges	Boolean
Arrays	Pattern
Control Structures	Other
Scope	Variable Declarations

Within each function type, a number of specific functions are available. Figure 10-4 shows some of the String functions that you can use, and all of the String operators. The `UpperCase ()` function used earlier in this chapter is on the list of string functions because it operates on strings of characters. Other function and operator types are equally well represented.
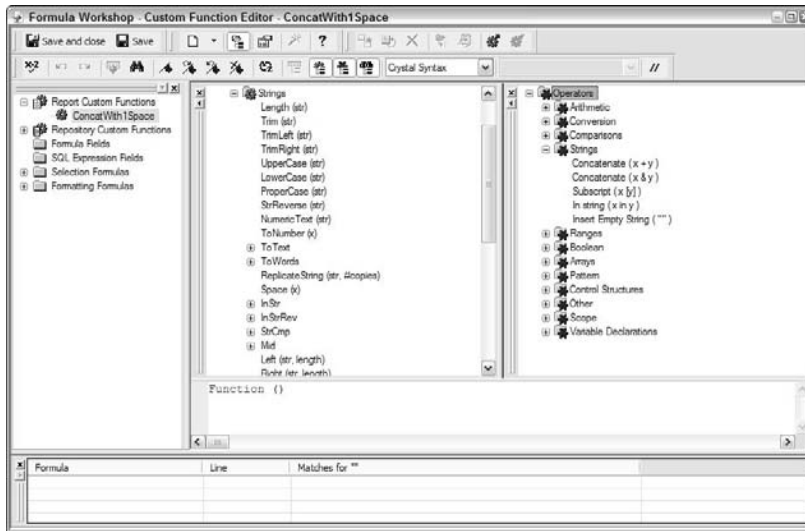
Figure 10-4:
String
functions
and
operators.

You can drag functions and operators down to the formula entry area to build a custom function, or you can directly type the function into the formula entry area.

7. Either drag the elements you need from the Functions and Operators panes or type your function directly.

To follow along with this example, expand the Strings branch in the Operators pane (because concatenation is a *string function*). You could specify concatenation in two ways: (x + y) and (x & y). If you drag the first formula (x + y) down into the formula-entry area, it deposits a plus (+) sign. If you drag down the second one, it deposits an ampersand (&).

In many cases (as in this example), it's easier to just type the formula rather than drag pieces of it from the trees in the panes above the formula-entry area.

8. In the pane below the Functions and Operators panes, type the para-meter declarations and the body of the function. Note that the word `Function ()` is already there.

The parentheses enclose any parameters that the function might use. Even if the function has no parameters, the parentheses remain, enclosing nothing.

For the example, you want to concatenate the contact first name and the contact last name from the Customers table, with one blank space between them. The two parameters, x and y, represent the two names you want to concatenate. Both are declared as string variables (StringVar). Type the following:

```
Function (StringVar x, StringVar y)
(x + " " + y);
```

This function concatenates a string with a blank space, and then concatenates the result with a second string.

9. **Click the Save and Close button to save the custom function ConcatWith1Space.**

This is just what you need to create a full name for customer contacts. It may also be useful in a number of other contexts. After you create a custom function, you can use it in many places and with any two string arguments.

Formula Editor

You can't use a custom function directly in a report; you must wrap the function in a formula. Therefore, the next order of business is to create a formula that applies your general concatenation function: specifically, concatenating the first and last names of customer contacts:

1. **Click the Formula Workshop icon.**

2. **In the Workshop tree on the left edge of Formula Workshop, right-click Formula Fields and choose New from the contextual menu that appears.**

3. **In the Formula Name dialog box appears, enter a name, such as** ContactFullName**.**

4. **Click OK.**

   Formula Editor appears, as shown in Figure 10-5. It looks a lot like Custom Function Editor (refer to Figure 10-2), with some differences.

In the Workshop tree on the left, expand the Report Custom Functions node. If you followed the running example in this chapter, notice that ConcatWith1Space is listed under it. Note also that ContactFullName is listed under Formula Fields even though you haven't added functionality to it yet. The formula exists; it just doesn't do anything yet.
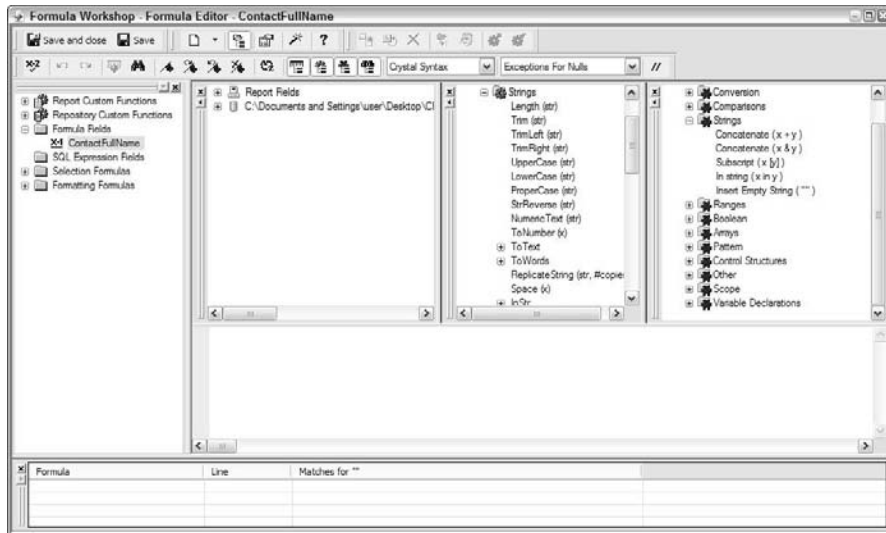
Like with the Custom Function Editor, you get useful things to include in your formula: The Functions tree contains standard functions, and the Operators tree contains operators. You can drag these functions and operators down to the appropriate spot in the formula you're building, or you can type them by hand. Often, it's easier to type them than to drag them. Formula Workshop also has a Report Fields tree, which Custom Function Editor doesn't have. You can drag fields from the Field tree into the appropriate spot in the formula you're building.

If you've been following along, you don't need these handy tools just now — although they're good to know about — because you already did most of the work of building this formula when you created the ConcatWith1Space custom function. In that case, all you need to do next is the following:

1. **Click your custom function under the Report Custom Functions node in the Workshop tree to send it down to the Formula pane.**

    To follow along with the example, click ConcatWith1Space. It appears in the Formula pane.

2. **Click the Save and Close button.**

The next step is to add the contact's full name to the report. You do that with the help of the Formula Expert.

Formula Expert

Currently, the Top Five USA Customers report lists the customer name, state, and order total for the five U.S. customers who have purchased the most merchandise from Xtreme Mountain Bikes. Suppose that at each of these customer sites, you want to insert the full name of the contact person between the Customer Name and the State columns:

1. **Switch to Design view.**

2. **Move the State and Order Amount columns in all the appropriate sections to the right to make room for the new column that will contain the contact's full name.**

3. **On the Expert Tools toolbar, click the Formula Workshop icon.**

4. **Expand the Formula Fields node in the Workshop tree, and then click the `ContactFullName` formula.**

5. **Click the Use Expert/Editor icon on the menu bar (magic wand icon).**

   Formula Expert appears in the Formula Workshop. The Custom Function Supplying Logic pane offers two entries: Report Custom Functions and Repository Custom Functions.

6. **Expand the Report Custom Functions node, and then click `ConcatWith1Space`, as shown in Figure 10-6.**

   In the Function Arguments pane, the x and y arguments from the `ConcatWith1Space` custom function await values. For this report, you want x to be Customer.ContactFirstName and y to be Customer.ContactLastName.
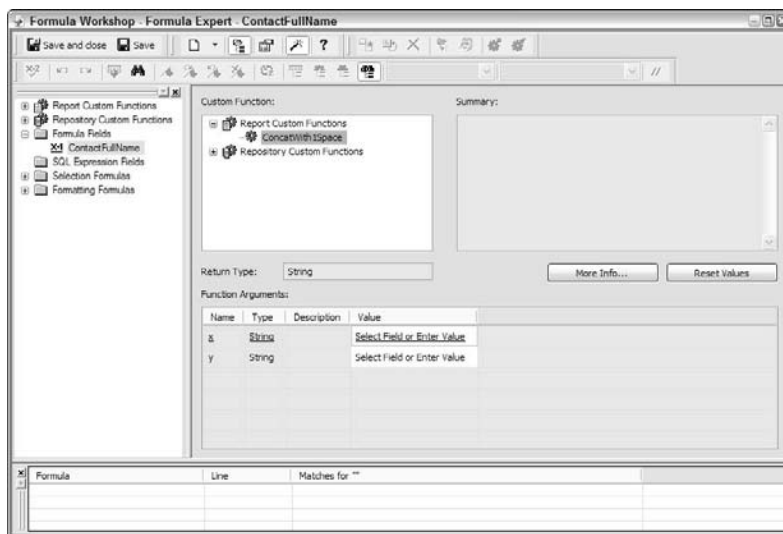
Figure 10-6: Details of the Contact-FullName formula.

7. **Click the Value field of the x row and then choose Choose Other Field from the drop-down menu that appears.**

    The Choose Field dialog box appears.

8. **In the Customer table, select Contact First Name and then click OK.**

    The selected field appears in the Value column for the x row.

9. **Click the Value field of the y row and then choose Choose Other Field from the drop-down menu.**

10. **In the Customer table, select Contact Last Name and then click OK.**

    The selected field appears in the Value column for the y row.

11. **Click Save and Close.**

12. **Back in Design mode, display Field Explorer (if it's not already displayed). From Field Explorer, drag ContactFullName from under Formula Fields and place it in the data band just to the left of the Region column.**

13. **Add Contact as a heading to section GH1b, above the full-name field.**

    An easy way to do this is to copy the State header, paste it above the ContactFullName column, and then edit it to read Contact instead of State.

Next, add the full name of the contact to your report:

1. **On the Insert Tools toolbar, click the Insert Text Object icon.**

2. **Place the resulting placement frame to a spot in GF1a, between the Customer column and the State column.**

3. **Drag ContactFullName from the Formula Fields node of Field Explorer to the placement frame.**

4. **On the Formatting toolbar, with ContactFullName selected, click the Bold icon.**

    The font in this column matches the font in the other columns. You might want to center the contact name, as was done with the state abbreviation.

5. **Switch to Preview mode to confirm that the names of the customer contacts appear where you want them.**

    You can always switch back to Design mode and adjust the position of the new column.

    Figure 10-7 shows the result.

6. **Save the report as `Top5USAwithContact`.**
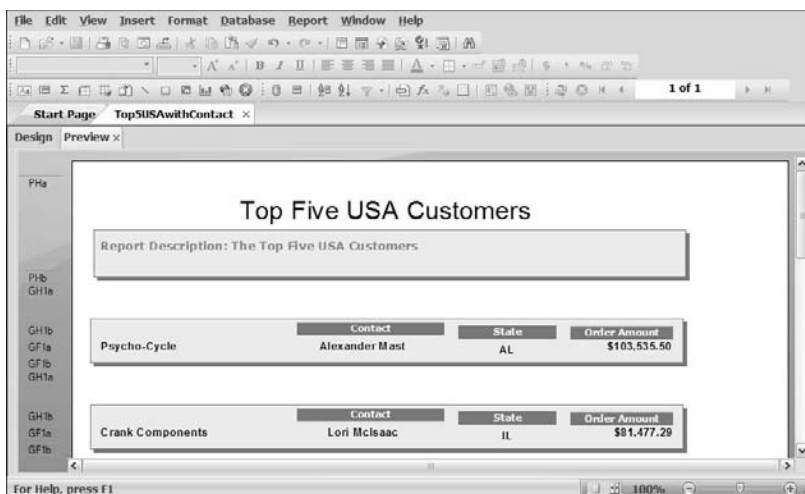
SQL Expression Editor

SQL Expression Editor is another incarnation of Formula Workshop. It's very similar to Formula Editor, but you use it to build SQL expressions from tables, functions, and operators. With an SQL *expression,* you can issue commands to the database that underlies your report — but you can retrieve no more than one database record at a time. With an SQL *statement,* you can retrieve multiple records in a single operation. Chapter 23 covers using SQL statements. To really handle SQL properly, though, you have to know more about it than this book has space to cover. For a thorough treatment, read *SQL For Dummies* (by yours truly, also from Wiley).

The SQL Expression Editor view of Formula Workshop looks exactly like the Formula Editor view of Formula Workshop except for the name in the title bar. You operate on it the same way, too. The only difference is that the expression that you build must adhere to legal SQL syntax. The SQL Expression Editor is an advanced feature; you probably won't use it until you have gained considerable experience with both Crystal Reports and with SQL.

Selection formulas

Crystal Reports offers three kinds of selection formulas:

- ✔ **Group selection:** By apply a group selection formula to a report you can restrict retrieval to a single group or to specific desired groups.

✔ **Record selection:** With a record selection formula, you can restrict retrieval to specific records. For example, in a report that groups sales figures by state, you can use a group selection formula to pull out the sales for a specific state. Similarly, you can use a record-selection formula to retrieve selected records (of specific customers and so on).

✔ **Saved data selection:** Saved data selection filters report data after the records have been stored in the report. The formula deals with only this saved data. Changing a saved data selection formula does not trigger a refresh from the database.

Group selection

To see an example of a group selection formula in action, start by opening the Customer Report, Grouped by State or District (USA) report (as described in Chapter 6). Note that the first page shows sales for Benny the Spokes Person, Psycho-Cycle, and The Great Bike Shop *in Alabama* because Alabama is the first state or district in an alphabetical sort on Region. Note also that the right side of the tab bar indicates that the report has multiple pages (`1 of 1+`).

This is the full report, with results for all Xtreme customers in the United States. But suppose you want to print a report for only a single state, North Carolina. Follow these steps:

 1. **On the Expert Tools toolbar, click the Formula Workshop icon.**

 2. **Expand the Selection Formulas node in the Workshop tree to display the Group Selection, Record Selection, and Saved Data Selection options.**

 3. **Select Group Selection.**

    Group Selection Formula Editor appears in the Workshop. You want to retrieve the records where the value of the Region field is `NC`.

 4. **Drag Customer.Region from the Report Fields pane down to the blank pane below the Fields pane.**

    You want to set that field equal to `NC`.

 5. **After the Customer.Region field, type an equal sign (=).**

    Alternatively, you could instead expand the Comparisons node in the Operators pane and drag down an equal sign.

 6. **Finish the formula by typing (after the equal sign) the two-letter state abbreviation, surrounded by single quotes.**

    Type **'NC'** to follow along with this example. The resulting formula is shown in Figure 10-8.
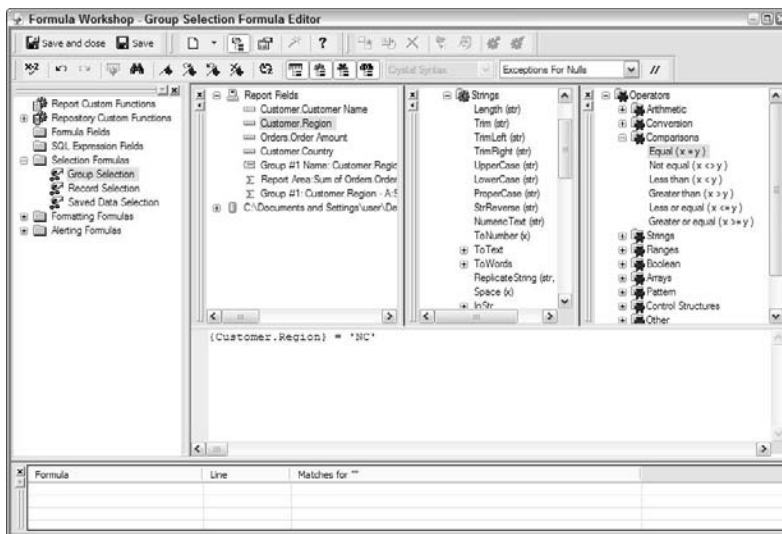
7. **Click the Formula Editor icon, located below the Save and Close button, to check your formula for syntax errors.**

8. **Click the Save and Close button to save the formula and close Formula Workshop.**

   Now when you look at the report, it consists of only a single page, showing information for only North Carolina. However the Grand Total in the report footer still shows the total order amount for the entire country.

9. **Close the report without saving.**

   The North Carolina report is a one-shot report that you probably won't have to run again.

Record selection

For record selection, you follow substantially the same steps as for group selection. Suppose you want to see all transactions in Customer Orders, Grouped by State or District (USA) in which the order amount was greater than $10,000. After opening the report, follow these steps:

1. **On the Expert Tools toolbar, click the Formula Workshop icon.**

2. **Expand the Selection Formulas node in the Workshop tree to display the selection options.**

3. **Select Record Selection.**

   Record Selection Formula Editor appears in Workshop. The Formula pane already contains a formula

   ```
   ({Customer.Country} = "USA")
   ```

   To add an additional constraint to retrieve records where the value of the Orders.Order Amount field is greater than 10,000, you must add a new clause to the formula.

4. **To the existing formula, append the keyword AND.**

5. **Drag Orders.Order Amount from the Report Fields pane down into the Formula pane below the existing formula.**

6. **Type > (a greater-than sign) after the Orders.Order Amount field.**

7. **Finish the formula by typing an amount after the greater-than sign.**

   Type **10000** to follow along with the example. The resulting formula is shown in Figure 10-9.

Figure 10-9:
Record
selection
formula
for orders
greater
than
$10,000.
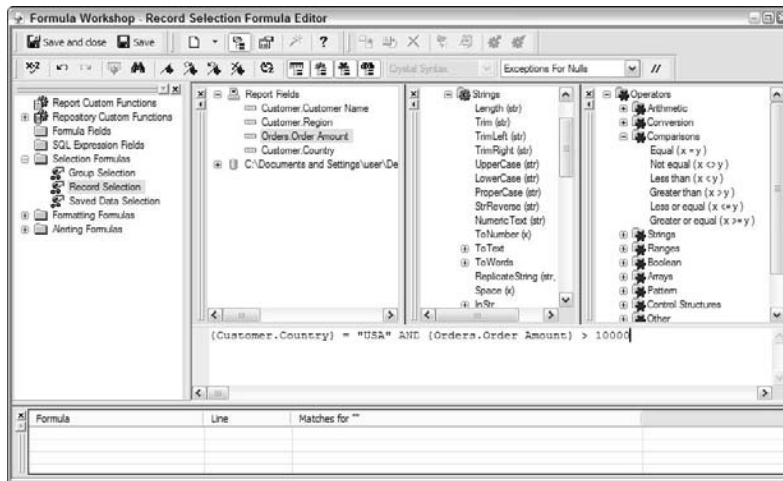
8. **Click the Formula Editor icon to check the formula for syntax errors.**

9. **Click the Save and Close button to save the formula and close Formula Workshop.**

   Presumably this is the type of information that management will want to see more than once while making decisions.

Now, when you refresh the data and look at the report, only orders greater than $10,000 are shown. Only ten states have customers with orders in excess of $10,000.

Formatting formulas

You can use formatting formulas to change various aspects of the format of a report. In this section, I show you how to change the heading color of the Customer Report, Grouped by State or District (USA) report (used in the previous section):

1. **Open Formula Workshop.**

2. **Expand the Formatting Formulas node in the Workshop tree.**

   Several subnodes appear, including the Report Header node.

3. **Expand the Report Header node.**

   The screen looks like Figure 10-10.

Figure 10-10: Formula Workshop, showing a formula in the Report Header.
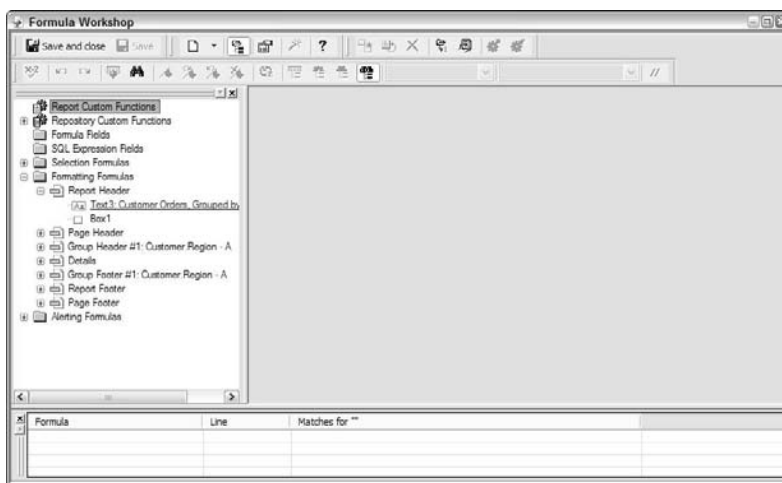
4. **Right-click the report title entry (Customer Orders, and so on) under Report Header and choose New Formatting Formula from the contextual menu that appears.**

5. **In the New Formatting Formula dialog box that appears, select Background Color, and then click the Use Editor button.**

   Format Formula Editor appears. Comments in the Formula pane, all preceded by a double slash (//), show the available colors.

6. **Select a color.**

   I chose Aqua, by typing `crAqua` in the Formula pane.

7. **Click the Formula Editor icon to check the syntax.**

8. **Click the Save and Close button to save the new formula and close Formula Workshop.**

   When Formula Workshop disappears, you see that the report now has a colored report heading.

You can add or change the formatting of any aspect of a report in the same way. Do a little looking around in the Report Fields, Functions, and Operators panes of Format Formula Editor to get an idea of what's available.

Changing and Deleting Formulas

In earlier sections of this chapter, I show you how to use Formula Workshop to create a formula. Modifying an existing formula is just as easy. Just display it in the Formula Workshop Formula pane, make whatever modifications you want, check it, and save it. Deleting a formula is even easier: Select it in the Workshop tree, and then click the Delete icon on the Workshop toolbar.

Data Types

Formulas deal with data, and databases can hold several different types of data. You use formulas to manipulate this data, but you must be careful to do it properly. For example, you can use the common addition, subtraction, multiplication, and division mathematical operators on number type data, but you can't multiply a number by a string. Specific operations apply to specific data types.

Simple data types

Some data types are more complex than others. The simplest data types are number, currency, string, date, time, datetime, and Boolean. Range types and array types are more complex. Look at the simple types first.

Number

The number type includes positive and negative integers and real numbers. When you enter number data, however, don't separate each group of three digits with commas. The only non-numeric characters allowed in a number are the decimal point and the negation sign. Following are examples of number-type data:

```
42
-273
3.1415927
93000000.
```

You can perform addition, subtraction, multiplication, and division operations on number data. Just make sure that you don't divide by 0. Doing so causes an error (not to mention gray hair on your poor old math teacher).

Currency

Currency data is similar to number data except that it starts with a dollar sign ($), and numbers to the right of the decimal point are rounded differently. Following are a few examples of currency type data:

```
$19.95
-$4000000000.
$64000
```

String

Character strings use different operators than those you use with numbers and currency. You can't add two strings, but you can concatenate them. You can convert a string to all uppercase or all lowercase, which is something you can't do with a number.

Strings must be enclosed in either single or double quotes. Here are a few strings:

```
"I Left My Heart in San Francisco"
"$19.95"
'You can put "quoted text" within a string.'
'You can even include an apostrophe in a string''s text'
```

As you can see, sometimes you must use quotes in an unusual way to keep from confusing the string parser. (The *string parser* is the part of Crystal Reports that analyzes and interprets strings, one character at a time.)

TIP

Anything within quotes is a string, even if it looks like a number or a currency value.

Date, time, and datetime

As you might surmise, the date data type holds dates, the time data type holds times, and the datetime data type holds a combination of the date and time. Date and time data types are somewhat redundant because the datetime data type can hold dates without times and times without dates. You might want to use the date or the time data type anyway, though, because data in those two types takes up less storage space in memory and on the hard disk than the same quantity stored as a datetime data type.

Datetime values are not strings or numbers. They are literals, which are handled differently from the way either strings or numbers are handled. Datetime literals are enclosed in pound (#) signs. This differentiates them from strings (which are quoted) and numbers (which are not enclosed in anything). Following are some examples of values that can be stored in the datetime data type:

```
#July 20, 1969#
#20 Jul 1969 4:18 pm#
#7/20/1969 16:18:00#
#7/20/1969#
#4:18 pm#
```

Boolean

Boolean data is named after the British mathematician George Boole, who invented Boolean algebra, which gave logic a mathematical foundation. Boolean data has only two values, `True` and `False`. Crystal Reports accepts `Yes` and `No` as synonyms for `True` and `False`. Boolean logic has been critical to the development of the digital computer, which uses ones and zeros to represent `True` and `False`.

Range data types

Crystal Reports enables you to restrict the values of data elements to a specified range for all data types except Boolean. For example:

`70 To 100` includes values between, and including, 70 and 100.

`70_To_100` includes values between, but NOT including, 70 and 100.

`70_To 100` includes values between 70 and 100, including 100 but not 70.

`UpTo 100` includes all numbers up to and including 100.

`"A" To_ "Z"` includes all character strings starting with an uppercase letter, except for strings starting with `"Z"`.

`UpFrom #1/1/2000#` includes all dates after the once-dreaded Y2K day.

Array data types

Arrays are ordered lists of values that are all the same type. In Crystal Reports, an array can contain data of a simple type or of a range type. Array elements are enclosed in square brackets, as in this example:

```
[2, 3, 5, 7, 11, 13]
```

This array contains the first six prime numbers. Or try planets:

```
["Mercury", "Venus", "Earth", "Mars"]
```

is an array containing the string values of the names of the terrestrial planets in our solar system.

You can subscript an array by specifying the index in square brackets after the array. (A *subscript* specifies a particular element of an array.) For example, the following use of brackets

```
[2, 3, 5, 7, 11, 13] [3]
```

specifies 5, the third element in the array.

You can also specify a range of elements, as follows:

```
["Mercury", "Venus", "Earth", "Mars"] [3 To 4]
```

This creates a new array, `["Earth", "Mars"]`.

Variables in Formulas

In the discussion of Formula Workshop, I use the `x` and `y` variables to act as placeholders for specific values in the `ConcatWith1Space` custom function. Whenever the formula parser encounters a variable in a formula, it looks for the value represented by that variable, and then plugs the value into the formula. Because the value of a variable can be changed by the user or assigned in the formula, variables give Crystal Reports considerable flexibility.

Declaring a variable

Before you can use a variable, you must declare it to make Crystal Reports aware of it. When you declare a variable, you must specify three things: its name, its scope, and its data type. The name could be something simple, such as *x* or *y.* It could also be something more descriptive, such as *topic.*

When you declare a variable's data type, stick `Var` on the end of the type, as in `StringVar` or `NumberVar`. Scope may be local, global, or shared. If a variable is *declared locally,* it is valid only in the formula in which it is declared. If a variable is *declared globally,* it's available to all the formulas in a report that declare it (except for subreports).

A *shared variable* is available to all formulas in a report that declare it, including subreports. Subreports are covered in Chapter 11.

Assigning a value to a variable

After you declare a variable, you can assign it a value. Here's an example:

```
//Declare topic1 to be a global variable of String type that
//specifies a book topic.
Global StringVar topic1;
topic1 := "Crystal Reports";
```

You can also declare a variable and assign it a value in a single statement, as follows:

```
Global StringVar topic2 := "SQL";
```

You can now use the variable in a formula.

Control Structures

Control structures enable you to alter the flow of execution from a strict sequential order to something else. For example, you can branch one way or another with an `If-Then-Else` control structure. You can branch multiple ways with a `Select Case` structure. You can loop through an expression or a set of expressions multiple times with a `For` or `While Do` structure. You can implement business logic (or illogic) to a fare-thee-well with these structures.

If-Then-Else

The `If-Then-Else` control structure is useful when you want to do one thing if a condition is true and another thing if the condition is false. Suppose you want to give a 5-percent discount to customers who order more than $10,000 worth of products in a single order. Before printing their invoice, you could have Crystal Reports make the calculation for you as follows:

```
//Give 5% discount for orders > $10,000
If {Orders.Order Amount} > 10000.
Then
     {Orders.Order Amount} * 0.95
Else
     {Orders.Order Amount};
```

If the condition is satisfied, `Order Amount` is multiplied by 0.95, giving a 5-percent discount. Otherwise, `Order Amount` is unchanged. The change to `Order Amount` applies only to this report. The data in the database is not affected.

> **TIP**
>
> The `Else` clause is required even though it doesn't change anything. The data type of the result returned from the `Else` clause must match the data type of the result returned by the `Then` clause. If you leave out the `Else` clause and the condition is not satisfied, the formula returns the default value for the data type.

Select Case

Use the `Select Case` control structure when you have more than two alternatives to choose from and you want to do a different thing in each case. Suppose the 5-percent discount you offered your customers last month resulted in a huge increase in sales, so you decide to expand the offer this month. Using a `Select Case` statement does the job:

```
//Give volume-based discounts
Select {Orders.Order Amount}
    Case 15000. To 1000000.:
        {Orders.Order Amount} * 0.93
    Case 12000. To 14999.99:
        {Orders.Order Amount} * 0.94
    Case 10000. To 11999.99:
        {Orders.Order Amount} * 0.95
    Default:
        {Orders.Order Amount};
```

If an order is between $15,000 and $1,000,000, a 7-percent discount is applied. Lesser discounts are applied for smaller orders. Below $10,000, no discount is applied. If an order comes through for more than $1,000,000, there must be a mistake, so no discount is applied. The `Default` clause is optional. If you omit it, the value of the selection condition is not changed. (It isn't changed in the preceding example either, but you avoid confusion by making it explicit.)

For loop

Like the `If-Then-Else` structure and the `Select Case` structure, using a `For` loop alters the flow of execution, but it alters it in a different way. Whereas using `If-Then-Else` and the `Select Case` constructs cause execution to take one path of execution rather than another, using a `For` loop causes execution to pass through a single piece of code multiple times.

A `For` loop is the best tool to use when you want to execute a section of code a predetermined number of times. Suppose you have a character field named `Size` in a table named `Product`, and you want to know how many instances of the letter *x* it contains. You can find out with a formula containing a `For` loop:

```
Local NumberVar Index;
Local NumberVar Xcount := 0;
Local NumberVar StringLength := Length ({Product.Size});

//loop through the characters in Size and count x's
For Index := 1 to StringLength Step 1 Do
(If ({Product.Size} [Index] = "x") Then
     (Xcount := Xcount + 1;)
 Else (Xcount := Xcount;)
);
Xcount
```

In the preceding example, `Product.Size` is treated as a string array, and `Index` is the subscript that points to each character in the array in turn. Execution steps through the `Size` field, one character at a time, counting the occurrences of *x* as it goes. If *x* occurs three times in the `Size` field, `Xcount` holds a 3. The last line in the formula returns the value of `Xcount`.

While Do loop

Whereas a `For` loop is designed for situations in which you know (or can compute) how many iterations of the loop you want to execute, using a `While Do` loop is ideal when you don't know the number of iterations. A `While Do` loop depends on the Boolean truth value of a condition. As long as the condition remains `true`, execution continues to loop. When the condition turns `false`, the current iteration of the loop is completed, and looping terminates. If the condition is initially `false`, the loop is not executed at all.

Suppose that in the preceding example, you wanted to know the character position of the first *x* rather than the total number of instances of *x* in the string. Because you don't know how far into the string the first *x* occurs (if at all), using a `While Do` loop is appropriate:

```
Local NumberVar Index := 1;
Local NumberVar Xpos := 0;
Local NumberVar StringLength := Length ({Product.Size});

//Find location of first x in Product.Size
While Index <= StringLength And Xpos = 0 Do
(If ({Product.Size} [Index] = "x") Then
     (Xpos := Index;)
 Else (Xpos := Xpos;)
Index := Index + 1;
);
Xpos
```

Note that if `Index` were initially greater than `StringLength`, the loop would be skipped.

Do While loop

A `Do While` loop is similar to the `While Do` loop, but whereas a `While Do` loop doesn't execute if the condition is not initially satisfied, a `Do While` loop is always guaranteed to execute at least once, regardless of whether the condition is satisfied. Sometimes you want the behavior of `While Do`, and other times you want the behavior of `Do While`. Crystal Reports gives you both.

With a `Do While` loop, you can accomplish the same character location task that was illustrated in the `While Do` loop example. The code is just a little bit different:

```
Local NumberVar Index := 1;
Local NumberVar Xpos := 0;
Local NumberVar StringLength := Length ({Product.Size});

//Find location of first x in Product.Size
Do
(If ({Product.Size} [Index] = "x") Then
    (Xpos := Index;)
 Else (Xpos := Xpos;)
Index := Index + 1;
While Index <= StringLength And Xpos = 0
);
Xpos
```

In this case, the loop is executed once, and the first character of `Product.Size` is checked to see whether it's an `"x"`. This occurs even if the condition is not satisfied because execution doesn't reach the condition until after the loop has been executed once. Thus, if (by some mischance) the value of `Index` was greater than `StringLength`, an `"x"` located beyond the end of the `Product.Size` string would cause `Xpos` to take on a nonzero value. This could be misleading and cascade into a significant error.

It's important to choose your loop type according to whether you want the loop to execute at least once, regardless of whether the condition is satisfied.

Chapter 11

Creating Reports within a Report

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*1*n other chapters, you see how to build reports based on the data contained in several related tables in a database. This is wonderful, but sometimes you want to build a report that displays data from two or more sources that are unrelated or related only indirectly. Crystal Reports meets that need by enabling you to embed one report in another: a *subreport*. Subreports allow you to take data from diverse sources and present it on one or a small number of pages, for ease of comprehension.

Combining Unrelated Reports

A standard report created by Crystal Reports can't display data from two tables that are not linked, but a subreport can. You use subreports when you have data tables that are unrelated or have an indirect relationship. With a subreport, information that doesn't need to be directly related to information in the primary report can be presented in a compact and convenient form.

The easiest kind of primary report/subreport combination to produce is one in which the two reports are unrelated but are of interest to the reader. Because the primary report and the subreport aren't directly related, you don't need to worry about linking them. Aside from the details of building the primary report and the subreport, your main concern is the placement of the subreport within the primary report.

You can embed a subreport within another report in two ways:

➤ **Open the primary report and create a subreport within it from scratch.**

➤ **Embed an existing report into another report as a subreport.**

In this section, I show you an example of embedding an existing report into a primary report.

Suppose the management at Xtreme Mountain Bikes wants to see the results of two reports — the Top Seventeen USA Customers report (`Top17USA.rpt`) from Chapter 9 and the Big Orders report (highest-value orders from customers worldwide) created in Chapter 5 — in a single report. Crystal Reports makes it easy to do: Just add the Big Orders report to the Top Seventeen USA Customers report. Big Orders becomes a subreport. From this report, you can easily tell not only which customers have a large cumulative total of purchases but also which of them tend to buy in large lots.

To start, follow these steps:

1. **Open the report that you want to use as the main report.**

   To follow along with the example, open the Top Seventeen USA Customers report. (The report file, `Top17USAfinal.rpt`, is shown in Figure 11-1.) This summary report fits on a single page. The Big Orders report also fits on a single page, so putting it into the report footer of the Top Seventeen USA Customers report gives you a handy two-page report.

Figure 11-1: The Top Seventeen USA Customers report.

2. **Switch to Design view.**

   The report sections are displayed, as shown in Figure 11-2. The report footer appears gray, indicating that it's suppressed. To display anything in this section, you must first reverse the suppression.
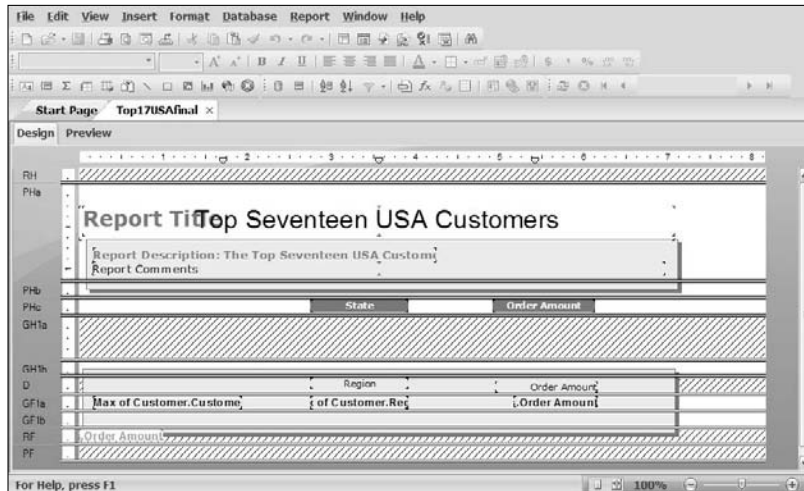
3. **Right-click the area to the left of the report footer section and choose Don't Suppress from the contextual menu that appears.**

   Now whatever you put in the report footer will be displayed.

4. **On the Insert Tools toolbar, click the Insert Subreport icon.**

   The Insert Subreport dialog box appears.

5. **Select the Choose an Existing Report option.**

6. **Click Browse.**

   A standard Open dialog box appears.

7. **Find and select the report that you want to use as the subreport. Then click the Open button to enter it in the Report File Name text box.**

   To follow along with this example, find and open the Big Orders with Template report.

8. **Click OK.**

9. **Drag the placement frame that appears at the cursor location into the report footer.**

   This gives you the layout shown in Figure 11-3.
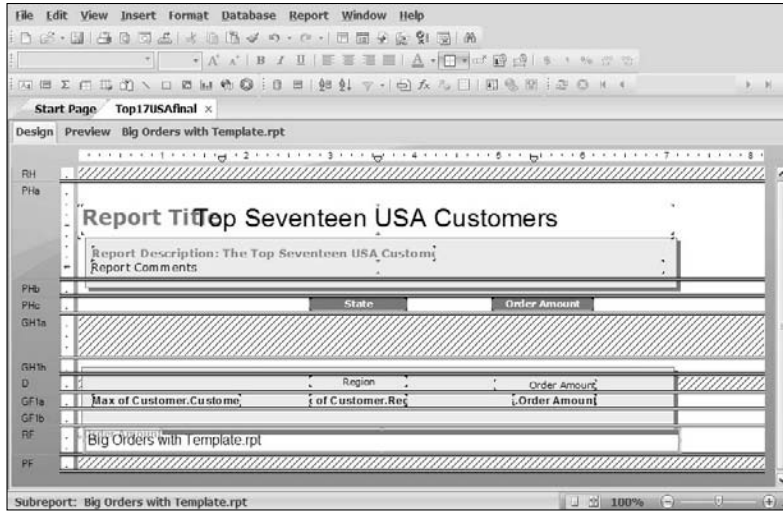
Figure 11-3:
Design view
of the
report and
subreport.

The template for the Top Seventeen USA Customers report was designed to take up the full width of a page and so was the Big Orders with Template report. A more common approach is that both the report and the subreport are half a page wide or less. That way the two reports can appear side by side without piling up, one upon the other. Thus these two reports are best used as an illustration, not as a realistic application of a subreport. The idea here is to show you how to include a subreport in a main report; make sure the template for your report can accommodate this operation.

10. **Switch to Preview mode.**

11. **If your report has a parameter field, a dialog box appears. Enter a value and click OK.**

    To follow along with this example, enter **9000** for the lower-limit value. Page 1 of the report is unchanged, but clicking the right-pointing arrow in the Navigation Tools toolbar displays Page 2, which includes the report footer, showing the Big Orders subreport. It includes all orders of $9,000 or more, as shown in Figure 11-4.

Figure 11-4:
Page 2
of the
report and
subreport.

Underlay formatting for side-by-side location of subreport

In the preceding example, I show you how to insert a subreport at the bottom of a primary report. For some applications, though, a subreport works best placed alongside the primary report for comparison. For this type of formatting (and several others), you use the *underlaying* feature of Crystal Reports, which enables you to lay a subreport under other material in the primary report.

When you underlay the material in any section, it goes "under" the material in the next section. In effect, the next section is overlaid, which might seem strange to do. After all, wouldn't underlaying just make the material in both sections unreadable? Yes, it would, if you left it that way — but here comes the trick that makes underlaying worthwhile.

TIP

Offset the overlaid material *to the right of the underlaid material.* One such use would be to place a chart immediately to the right of the data it's developed from. Another use is to place a subreport immediately to the right of related material found in the primary report.

Both the Big Orders report and the Top Seventeen USA Customers report are too wide to fit comfortably side by side on standard 8½ x 11" paper in portrait orientation. However, if you know ahead of time that you want to combine two reports as a primary report/subreport combination, you can format them so they work together to effectively convey the information you want to deliver. Here's how:

1. **Place your subreport in the Report Header or a Group Header section.**

2. **Click the Section Expert icon on the Expert Tools toolbar.**

   The Section Expert dialog box appears.

3. **Select the section into which you have placed the subreport.**

4. **Select the Underlay Following Sections option, and then click OK.**

   The subreport now lays under the sections that follow it: in effect, putting them on top.

Make sure you format the subreport so that it's offset far enough to the right to not interfere with any content in the primary report.

Drilling down in a subreport

As I explain in Chapter 6, *drill-down* enables you to keep the focus on your summary while also keeping details available offstage. The capability hides detailed information when you want to produce a summary report while still keeping that information available if a user wants it. If hidden detailed information is available in a summary report, the user's cursor changes to a magnifying glass when it passes over the summary field. Double-clicking while the cursor is a magnifying glass makes the detailed information appear. When you have placed a subreport in a primary report, however, drill-down works a little differently.

Subreport drill-down versus report drill-down

When you pass the cursor over a subreport, the cursor changes to a magnifying glass, regardless of whether the subreport itself supports drill-down. If you double-click, a Preview tab for the subreport appears to the right of the Preview tab of the primary report. No additional detail appears in the report (yet), and the cursor changes back to the normal pointer.

After you open the subreport, however, drilling down works just like it does in a normal primary report. When you move the cursor over a summary field that supports drill-down, the cursor changes into a magnifying glass. Double-click to make the detailed information that supports the summary appear. A drill-down tab for that information also appears to the right of the subreport's Preview tab.

Handling tab overflow

When you implement drill-down, the tab bar starts to fill up. With the tabs for the primary report (including possible drill-down tabs) and the tabs for the subreport (including multiple possible subreports), the tab bar might become over-full. If it can't display all the tabs at once, click the left and right arrows on the tab bar to move left and right (respectively) through the tabs. In addition, click the *x* in the current tab when you want to close it. The tab immediately to its left opens. This is a helpful tool for getting rid of tabs that you no longer need.

Figure 11-5 shows the tab bar, including drill-down tabs, left and right movement arrows on the right, and the *x* button that closes the current tab.
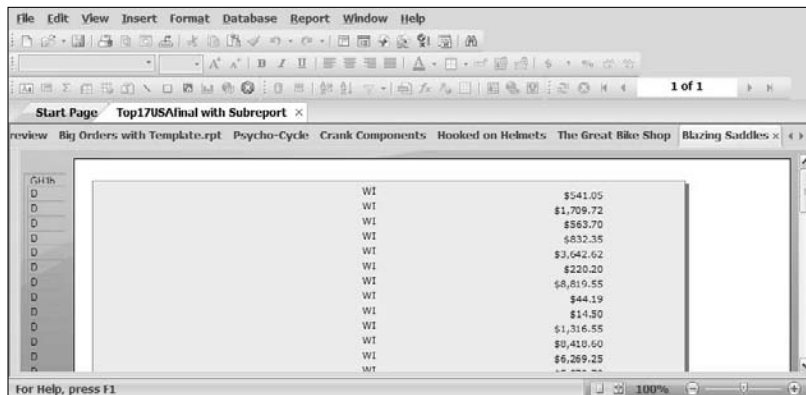
Figure 11-5:
Click the arrows to move through the tab bar.

Linking a Subreport to a Primary Report

One of the most valuable uses of a subreport is to have it supplement related information displayed in the primary report. To set up this useful relationship, link the subreport to the primary, using a field that's shared by the tables forming the basis of the primary report *and* the subreport. (Alternatively, you can form the link by using formula fields.)

Suppose you have a primary report that holds name and address information for Xtreme's customers in Michigan. Another report — soon to become the subreport — holds order data for Michigan customers.

The primary report, MIcust, is a simple report, containing the CustomerID, Customer Name, Address1 and Address2 fields, as well as City, Region, and Postal Code. The fields from the Customer table have been dropped into text fields to allow formatting of lines that contain more than one database field. This is the technique I use in Chapter 7 when creating mailing labels. A filter has been applied so only the customers whose Region is MI appear in the

report. The subreport, MIorders, contains Order Date, Order Amount, and Ship Date for all orders made by Michigan customers. It also includes the Customer table, although no fields from that table are displayed. The table is present only to provide a link to MIcust.

To create the full report, follow these steps:

1. **From the Start Page, click Blank Report.**

   Database Expert appears.

2. **Select `xtreme.mdb`, expand the Tables node, move Customer to the Selected Tables pane, and then click OK.**

3. **Click OK to dismiss Database Expert. Display Field Explorer if it isn't already visible on the workspace.**

4. **In Field Explorer, expand the Database Fields node to display the available tables.**

5. **Expand the Customers node to show the columns in the Customers table.**

6. **Expand the Details area downward to accommodate three lines of text.**

7. **Using text boxes and the fields in Field Explorer, put a three-line address in the Details area, with the following:**

   • Customer Name on the first line

   • Address1 and Address2 on the second line, separated by a comma

   • City, Region, and Postal Code on the third line, with a comma and a space between City and Region, and a space between Region and Postal Code

8. **Save the report with the name MIcust.**

   Figure 11-6 shows what the report looks like in Design view.
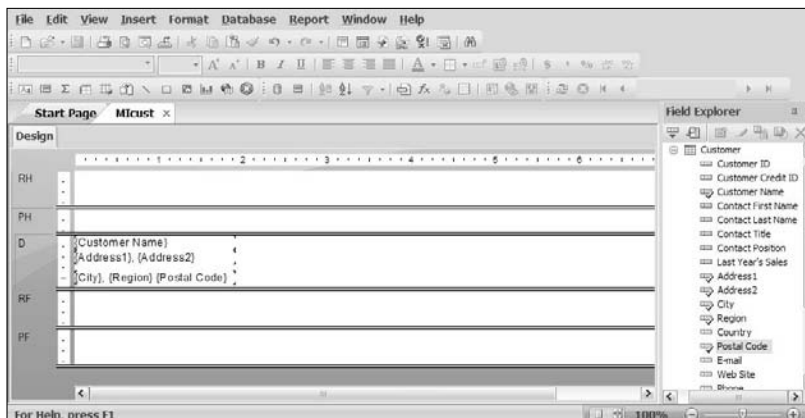
Figure 11-6:
Design view of the MIcust report.

With the primary report in place, create the subreport:

1. **Choose Insert⇨Subreport.**

   The Insert Subreport dialog box appears. It gives you a choice between using an existing report as a subreport or creating one with the report wizard.

2. **Select Create a Subreport with the Report Wizard.**

3. **For the New report name, enter** MIorders**.**

4. **Click the Report Wizard button.**

   The Standard Report Creation Wizard appears.

5. **Connect to the `xtreme.mdb` database.**

6. **Expand the Tables node; from the list of columns that drops down, select Customer and Orders.**

7. **Click Next to display Link view.**

   Link view shows that the Orders table is connected to the Customer table by the Customer ID column, which they have in common.

8. **Click Next to display Fields view. Transfer Order Date, Order Amount, and Ship Date to the Fields to Display pane on the right.**

9. **Click Next twice to skip Grouping view.**

10. **In Record Selection view, transfer Region from the Customer table to the Filter Fields pane. In the menus that pop up below the Filter Fields pane, specify** *is equal to* **and** *MI.*

11. **Click Next to move to Template view, verify that No Template is selected, and then click Finish.**

12. **When the Insert Subreport dialog box reappears, click OK.**

    The Insert Subreport dialog box disappears, and a placement rectangle appears at the cursor.

13. **Drop the placement rectangle in the Details area, to the right of the Customer Name field.**

14. **Click the MIorders tab to display it in Design view.**

15. **Because MIorders is the subreport, suppress RHa, RFa, and RFb to free up some vertical room. Delete Print Date from RHb and close up the vertical space that it leaves behind, leaving only enough room for the column titles.**

    Figure 11-7 shows the MIorders report in Design view at this point.

    MIcust now looks like Figure 11-8 in Design mode and like Figure 11-9 in Preview mode.

Figure 11-7:
Design view of the MIorders report.
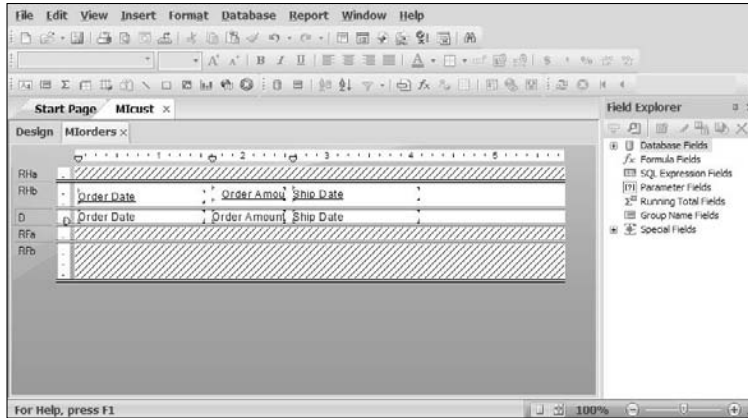
Figure 11-8:
Design view of the report, with the subreport.
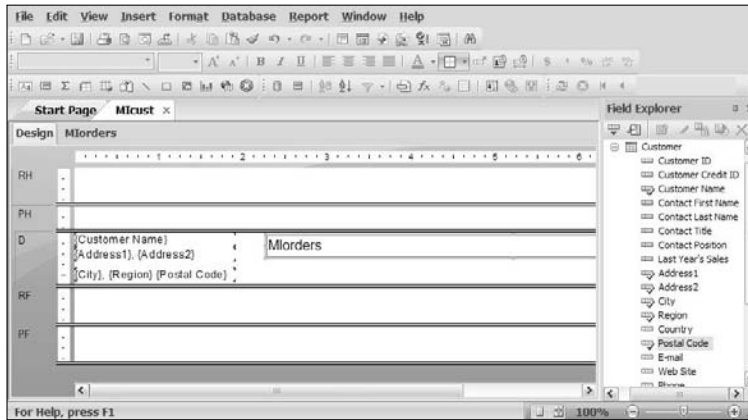
Figure 11-9:
Preview of the report, with the subreport.
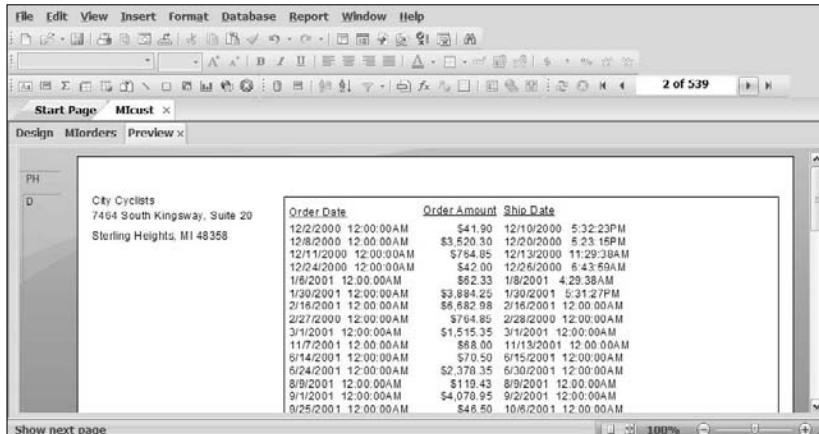
To establish the link between the primary report and the subreport, do the following:

1. **With the primary report open, right-click the subreport.**

   The menu shown in Figure 11-10 appears.

Figure 11-10: The subreport menu.
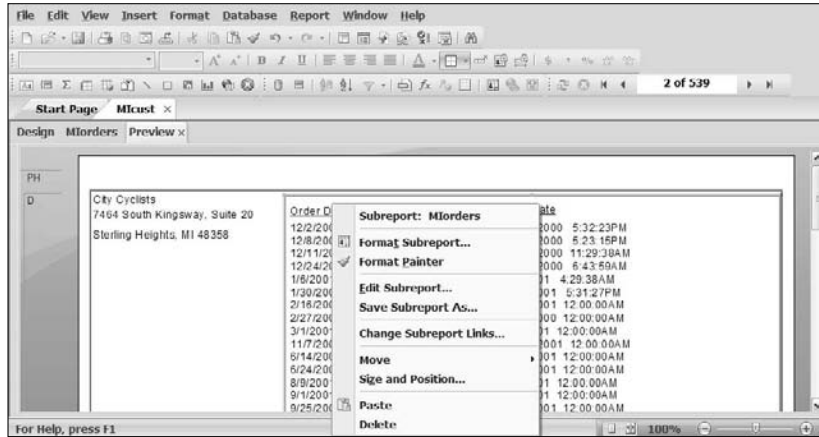
2. **Choose Change Subreport Links.**

   The Subreport Links dialog box appears, as shown in Figure 11-11.

Figure 11-11: The Subreport Links dialog box.
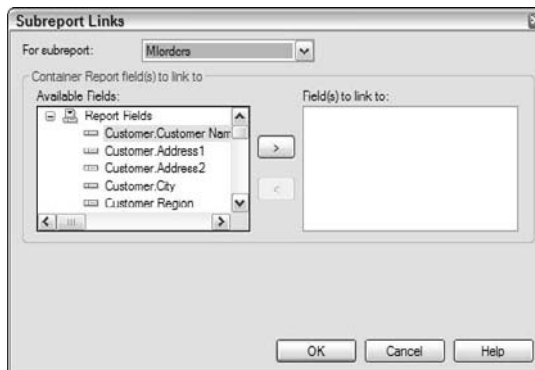
3. **Select one or more fields in the Available Fields pane and click the > button to move it to the Field(s) to Link To pane.**

   These fields should be present in one of the tables used in the primary report.

To follow along with the example, choose CustomerID as the linking field. The Subreport Links dialog box now looks like Figure 11-12.

Figure 11-12:
The Subreport Links dialog box, with linking field.
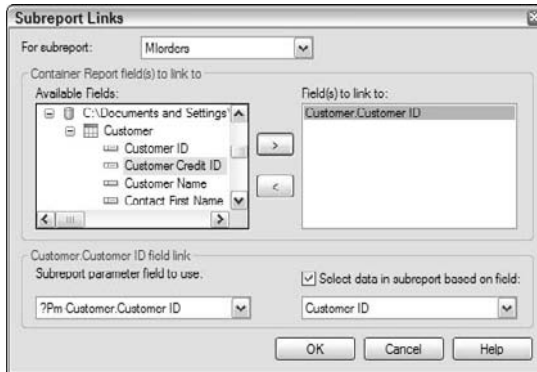
4. **Click OK.**

   The Change in Record Selection Formula dialog box appears and asks whether you want to use saved data or refresh the data.

5. **Click Refresh Data.**

   Now the records appearing in the subreport correspond to the primary report records in the same data section. Showing only Michigan records, the report only has two pages instead of more than 500.

   I use Record Sort Expert to sort the subreport by order date, and then use Format Editor to remove the default border line around the subreport. (To invoke Format Editor, right-click the MIorders rectangle in the MIcust Design view of the report and chose Format Subreport.) The report now looks like Figure 11-13.

Figure 11-13:
MIcust report with MIorders subreport.

Subreports need not be linkable

The example in the "Linking a Subreport to a Primary Report" section shows how to link a subreport to a primary report when the linking field is shared by both reports. However, sometimes, you want to combine two reports that don't have a column in common. Such reports can't be linked in the usual way, but you might be able to link them by using a formula field.

Suppose one of your reports is based on a table that has a First Name field and a Last Name field.

The other report you want to use is based on a table that has a Full Name field; no other fields in the two tables are even close to being the same. A solution to the problem would be to create a formula in the first report that concatenates the First Name and Last Name fields with a single blank space in between. The resulting full name could then be used as a linking field with the Full Name field in the second table. Problem solved. (Chapter 10 covers formulas in detail.)

On-Demand Subreports Boost Efficiency

On-demand subreports can be valuable when you have a report that contains multiple subreports. The primary report doesn't actually contain the subreports. Rather, it contains hyperlinks to the subreports. The subreports aren't read from the database until the user clicks the hyperlink. This way, only subreports that are viewed travel from the database server to the user's client, reducing the load on the network from what it would be if the user downloaded the full report, including all subreports.

To make MIorders an on-demand subreport of the MIcust primary report, follow these steps:

1. **Place MIorders into your primary report, select it, and then choose Format⇨Format Subreport from the main menu.**

   The Format Editor dialog box appears.

2. **Click the Subreport tab, as shown in Figure 11-14.**

3. **Select the On-demand Subreport check box.**

4. **Click OK.**

   Instead of including each customer's orders in the report, each order now has a hyperlink. The report size has shrunk to a single page, as shown in Figure 11-15.

On-demand subreports are purely electronic; they don't work with printed reports. (Ever try to click a printed hyperlink? But you knew that.) On-demand subreports require a database connection.

Figure 11-14:
The Format
Editor
dialog box
Subreport
tab.
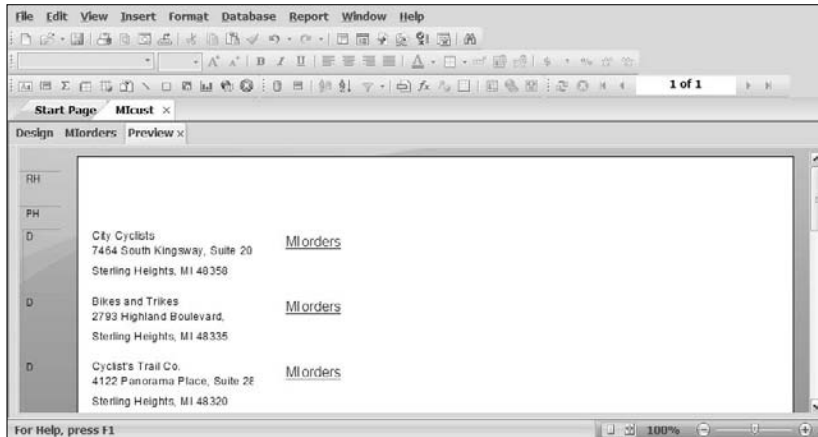
Figure 11-15:
MIcust
report with
On-demand
subreports.

Passing Data between Reports

Crystal Reports allows you to pass data from a primary report to a subreport
or from a subreport to its primary report. You can do so by using formulas
containing *shared variables* that are common to a report and all its subreports.
You must declare shared variables in a formula in the main report, and then
declare the same shared variables in any subreports that need to exchange

data with the main report. You might want to pass a shared variable from a primary report to a subreport for display in the subreport or as a selection criterion in the subreport.

REMEMBER

Before a value can be passed between the main report and the subreport, these conditions have to apply:

- ✔ **A shared variable must be declared *and assigned a value* in a formula in the main report.**

  You can read about using formulas in Chapter 10.

- ✔ **The same shared variable must be declared in a formula in the subreport.**

- ✔ **To pass a value from the subreport to the main report, you must make both declarations but assign the value in the subreport.**

Troubleshooting Subreport Problems

Sometimes, you get odd results from reports containing subreports because of the order in which reports are processed. Formulas in the main report are processed before those in subreports. Thus, if you set the value of a shared variable in a subreport and then pass the variable to a group footer in the main report, you might find that the main report is using the value of the shared variable from the *previous* group rather than from the *current* group. To avoid this problem, create an additional group footer in the main report, such as Group Footer 1b (GF1b). Place the subreport in GF1a and retrieve the value of the shared variable in GF1b. This associates the shared variable with the proper subreport.

As you might expect, reports that contain subreports process more slowly than reports that don't. However, you can do a few things to lessen the problem:

- ✔ **If your report contains multiple subreports:** Consider changing the subreports to on-demand subreports. This way, only the subreports that the user is interested in are downloaded from the server. This tweak could have a major effect on system-response time.

- ✔ **If you're using linked subreports:** Make sure that the linking field is indexed. Doing so can bring a tremendous boost to performance.

- ✔ **If you're linking a report to a subreport using a formula field:** Make sure that the formula field is on the main report — and that it corresponds to a database field in the subreport. Requiring a formula calculation in the subreport makes the processing migrate from the server to the client, using network bandwidth and performing calculations on a slower machine.

Chapter 12

Combining Report Elements with OLE

*T*he primary purpose for a report is to present database data to users in a form that's easy to understand. Crystal Reports gives you all the tools you need to do that. Sometimes, however, you want a report that does more than just present database data. For example, you might want to include text from a word processing file, or data that resides in a spreadsheet, or a graphical image stored as a bitmapped image file. To allow the sharing of various kinds of information in different kinds of files, Microsoft developed the OLE (Object Linking and Embedding) architecture.

Overview of OLE

Reports that you create with Crystal Reports can serve as OLE *container applications.* That is, they can contain OLE objects that were created by other applications, called OLE *server applications.* Such contained objects are *container documents.* The corresponding objects in the server applications are *server documents.* Microsoft Word and Microsoft Excel are examples of OLE server applications, and Microsoft Word document files and Excel spreadsheets are examples of server documents. You can take text from a Microsoft Word file or take an Excel spreadsheet as an OLE object and place it in a Crystal report.

Crystal Reports can also function as an OLE server application. You can define a report as an OLE object and place it into a Word text file, an Excel spreadsheet, or any other OLE-compatible container application. In cases such as this, the report residing in Crystal Reports is the server document, and its corresponding object in the Word text file or Excel spreadsheet is the container document.

OLE offers an unusual advantage: When you bring an OLE object into Crystal Reports and place it in a report, the object maintains a relationship with the application that created it. The nature of that relationship depends on whether the OLE object is static, embedded, or linked.

Static OLE Objects

A *static OLE object* is a snapshot of an object that's copied from the original application to the container application. Here's the rub, though: After you place a static OLE object in a Crystal report, you can't edit it or change it in any way (except to delete it). A static OLE object doesn't maintain any connection to the application that created it.

A static OLE object is not the thing itself but merely a graphical image of that thing — and that's why static OLE objects can't be edited. Four pixel-based image formats are supported:

- ✔ Windows bitmap (BMP)
- ✔ TIFF
- ✔ JPEG
- ✔ PNG

In addition, the vector-based Windows metafile (WMF) format is supported.

Inserting a static OLE object into a report

Here's how to insert a graphic image into a report. Follow along by inserting the Xtreme logo, or some other suitable image into the report header of the Big Orders report that you can see how to create in Chapter 5 and then modify in Chapter 8:

1. **Open `Big Orders.rpt` and switch to Design mode (if you're not already in it).**

   The Report Header is empty.

2. **Choose Insert➪Picture.**

   The Open dialog box appears, as shown in Figure 12-1.
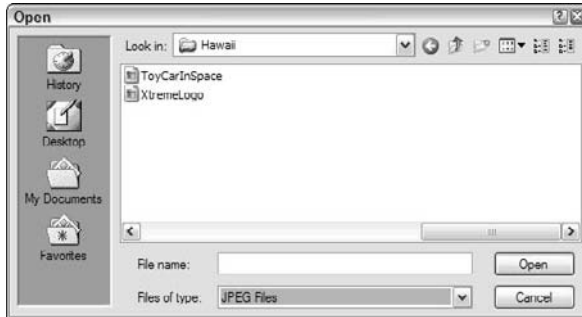
3. **Select an image.**

   Make sure that the file is a supported type (see the preceding section), and that you choose an image about the size of a company logo. Other than those two caveats, it doesn't matter what you choose because the point of this exercise is just to show you how to insert any static OLE object into a report. For this example, I use the Xtreme logo.

4. **Click Open.**

   A placement rectangle appears on your form.

5. **Place the placement rectangle in the upper-left corner of the form and then click the mouse to place it there.**

   The Report Header section automatically expands vertically to accommodate your image. Figure 12-2 shows the Big Orders report in Design view at this point.
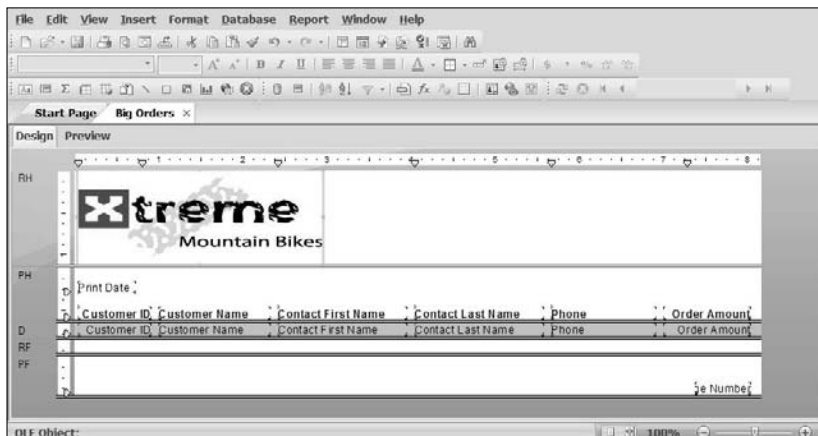
Figure 12-2:
Place a logo
as a static
OLE object.

6. **Right-click your newly placed image.**

   In the contextual menu that opens, you can see that the image is identi-
   fied as an OLE Object.

7. **Switch to Preview mode.**

   You get the report shown in Figure 12-3.
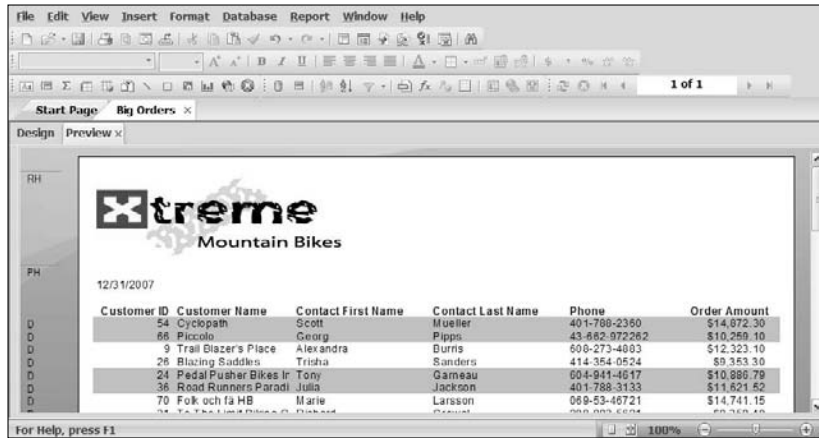
At this point, double-clicking the OLE object has no effect because this is
merely a *static* OLE object. For more excitement, I talk later about embedded
OLE objects. For now, consider what you can do if you want to modify a
static OLE object in a report.

Making a static OLE object editable

Although you can't edit a static OLE object, you can change it into a bitmap
image object. Applications such as Microsoft Paint — which, like Word and
Excel — is an OLE server application, can operate on a bitmap image object.

Here are the steps to make a static OLE object editable:

1. **Right-click the static OLE object that you want to edit.**

2. **From the menu that pops up, choose Convert Picture Object.**

   The Convert dialog box, as shown in Figure 12-4, opens.

Figure 12-4:
Convert
a static
graphic
file here.
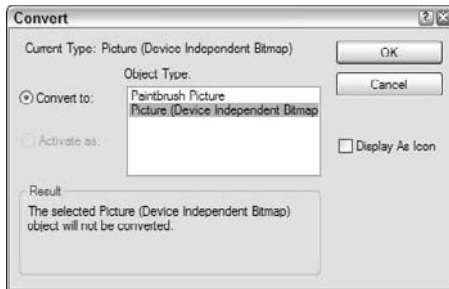
3. **Select Paintbrush Picture as the object type and then click OK.**

   This permanently changes the selected picture from a static OLE object to a Paintbrush picture object.

4. **Right-click the picture object.**

   The contextual menu now has an entry named Bitmap Image Object, which has a submenu, as shown in Figure 12-5.

Figure 12-5:
The bitmap
image
object has
editing
options.
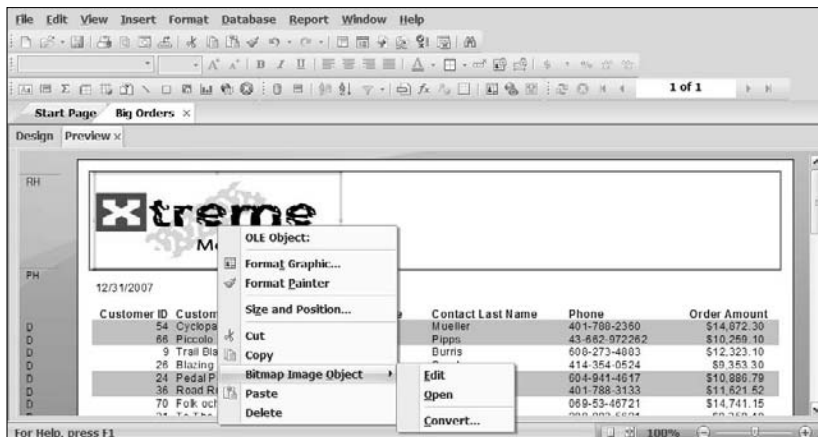
5. **Choose Edit.**

   Microsoft Paint launches. You have access to the Paint editing tools to modify the object. When you save the modified object, it appears in modified form in your report.

Embedded OLE Objects

As with a static OLE object, an embedded OLE object is downloaded entirely to the container application, but with an important difference: An embedded object is no snapshot. It has an "awareness" of which server application created it, and you can edit it within the container application (namely, your report). When you double-click an embedded OLE object, it becomes editable. The server application takes over the menus and toolbars to allow editing. For example, if you embed an Excel spreadsheet into a report, you can edit the spreadsheet from within Crystal Reports using the Excel menus and toolbars.

TIP

To edit an Excel spreadsheet, for example, that's embedded in a Crystal Report, Excel must be present on the machine on which you're editing.

Embedding an OLE object into a report

To see how to embed an OLE object into a report, we could use a Word document, an Excel spreadsheet, or any other container object. To keep things simple, use a graphical image. This time, use a bitmap (BMP) file. This file type uses Microsoft Paint as its default application.

1. **Load the Big Objects report into the Crystal Reports workspace and switch to Design mode.**

2. **From the main menu, choose Insert⇨OLE Object.**

   The Insert Object dialog box opens, as shown in Figure 12-6.

Figure 12-6: The Insert Object dialog box, showing object types.
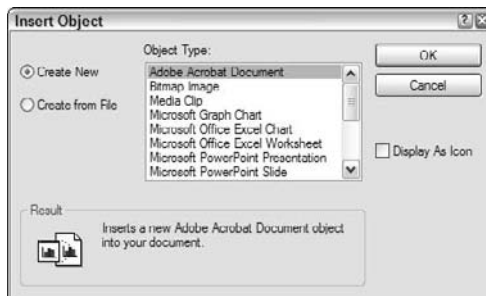
3. **Select the Create from File radio button.**

   The dialog box changes to appear like Figure 12-7.

TIP

If you select Create New rather than Create from File, you could then create an OLE object directly within your report. It could be any of the object types listed in the Object Type list, provided that the appropriate OLE server application is present on your computer.

Figure 12-7:
The Insert
Object
dialog box,
asking for
a filename.
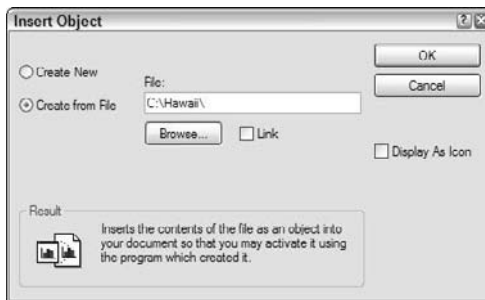
4. **Fill in the name of the file you want to embed — or browse for it — and then click OK.**

   A placement rectangle appears on your form.

5. **Place the rectangle where you want the image to appear in the report.**

   For this example, place the placement rectangle in the upper-right corner of the form and then click the mouse to place it there. Figure 12-8 shows the result.

Figure 12-8:
Embedding
a graphical
image in a
report.
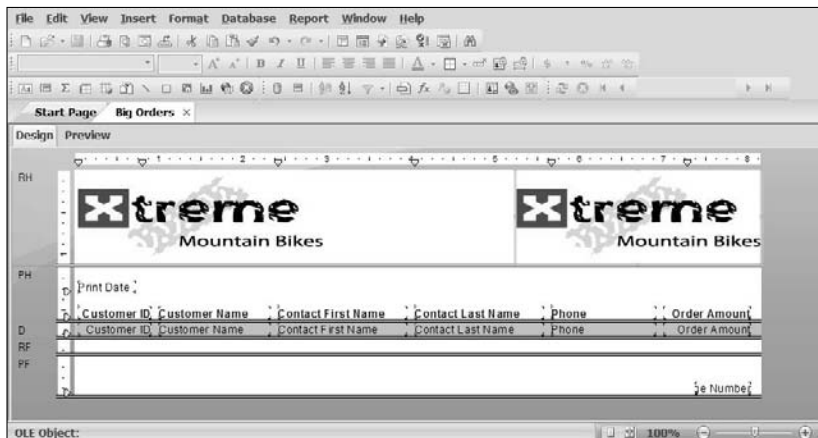
The image on the right looks just like the one on the left, but looks can be deceiving. The image on the left is a bitmap image object (from earlier in this chapter), and the one on the right is an embedded OLE object.

6. **Double-click the embedded OLE object (in this example, the image on the right).**

   The drawing tools from the Paint OLE server application become available within Crystal Reports (see Figure 12-9).
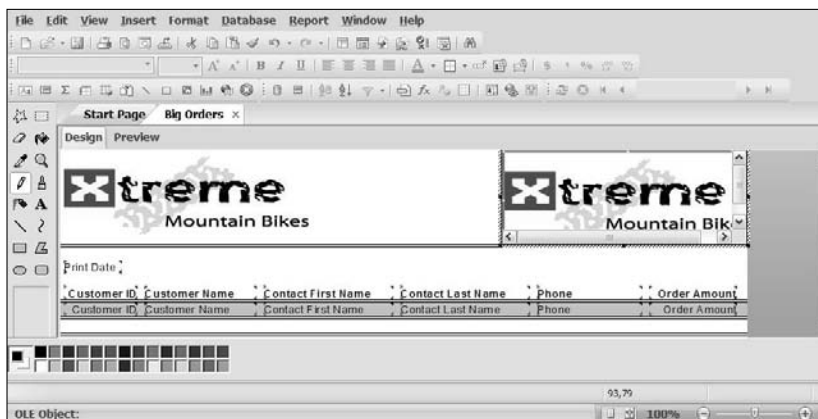
Figure 12-9:
Edit the embedded object within the report.

Although the embedded object in the report is editable — using the tools of its server application — it's not the original file but only a copy. Any changes that you make to the embedded object have no effect on the original file from which the embedded object was taken.

Linked OLE Objects

Linked objects are like TV screens: The actual data items don't move to the container application. Instead, the container application contains an image of the linked object (which remains in the server application). This link means that whenever the original object in the server application is updated, the linked object in the container application is updated as well, and vice versa. Suppose, for example, that your server application is Excel, and you update the data in a linked spreadsheet. The next time you run your report in Crystal Reports, it pulls the latest data from the Excel file to display in the report.

Using linking is best if

✔ Your report must always reflect the latest data.

✔ You want the data in multiple applications to remain synchronized.

An advantage of using a linked image is that it takes up less space than embedding a large spreadsheet or Word document, which makes the report faster to load. However, reports containing linked objects are less portable than reports containing embedded objects.

Another point of consideration is the server application. For the link to work, the original server application must be present on the machine that's running Crystal Reports. By contrast, an embedded object needs no link to its source file although it does require a copy of its OLE server application to be available.

Creating a linked OLE object is very similar to creating an embedded one. In the preceding section, I show you how to embed an existing file into a report. You could just as easily embed a file created from scratch.

Linking differs from embedding in that you can link to an existing file, but creating a file from scratch within your report does not involve linking. In order to link to a file, it must first exist outside your report.

Here are the steps for linking to a server document:

1. **Display your target report in Design mode.**

2. **Choose Insert⇨OLE Object.**

   The Insert Object dialog box appears (as shown in Figure 12-10), listing the types of files you can insert as OLE objects.

Figure 12-10: The Insert Object dialog box, showing available object types.
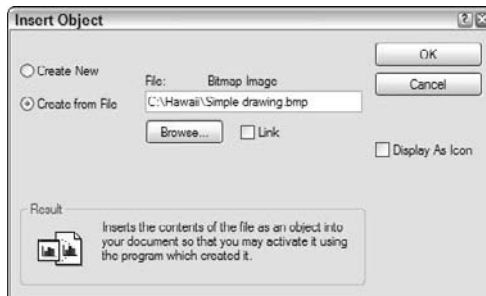
3. **Select the Create from File radio button.**

4. **Specify the file you want to link to.**

   For this example, I select a bitmap image of a simple drawing that I made, but you could use any file of the supported object types.

5. **Select the Link check box to enable it (as shown in Figure 12-11) and then click OK.**
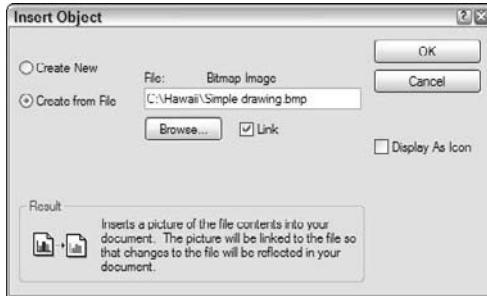
Figure 12-11:
Link to an
existing file.

An object-placement frame appears at the cursor position.

6. **Drag the placement frame to the appropriate section of the report.**

   For this example, place the new image in the center of the report header by clicking the left mouse button. The image of the linked object appears where you place it, as shown in Figure 12-12.
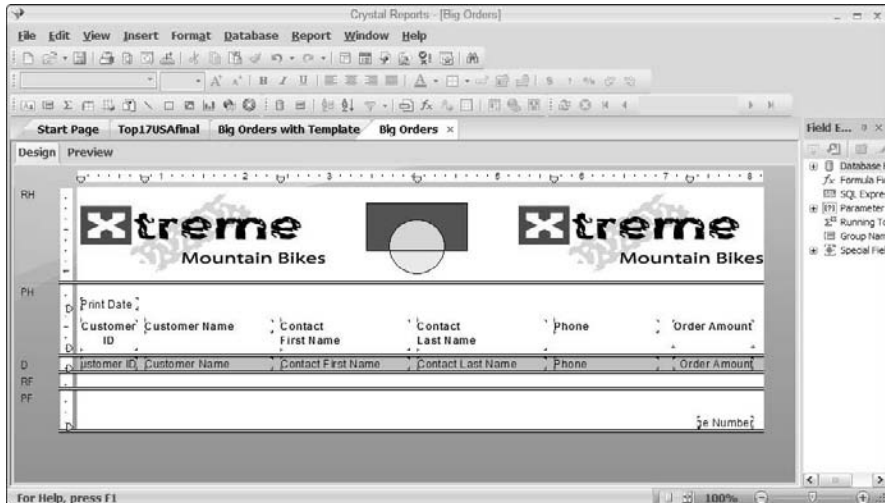
Figure 12-12:
A linked
object is
added to
the report.

7. **To edit the newly placed linked object, double-click it.**

   The object's server application launches, which you can then use to edit the object.

   Your edits are reflected in both the original object and in the image in your report.

   Figure 12-13 shows the linked object after it's been edited in Paint.
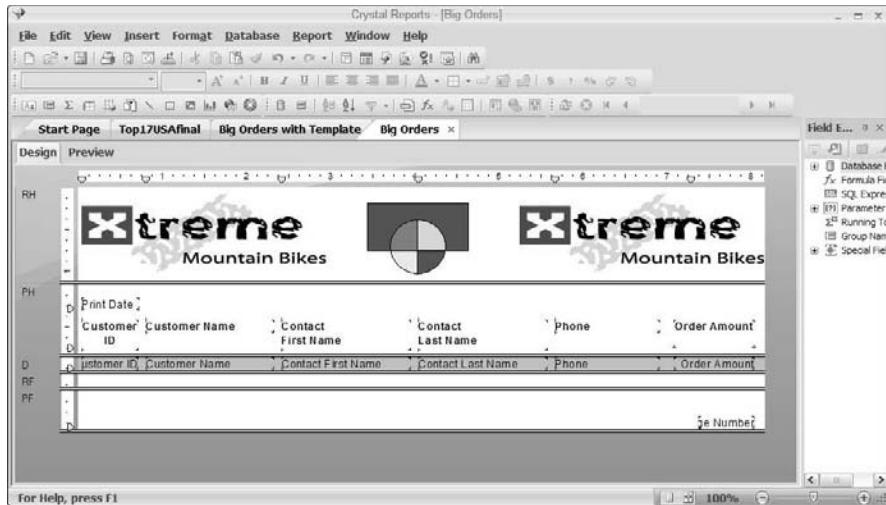
Figure 12-13:
A linked
object after
editing.

Embedding or Linking an Object Taken from a File

To embed or link an object taken from an OLE server application (rather than an entire file) into a report, follow these steps:

1. **Copy the object to the Windows Clipboard.**

2. **From the Crystal Reports menu, choose Edit⇨Paste Special.**

   The Paste Special dialog box appears.

3. **Select Paste or Paste Link.**

   If you select Paste, the Clipboard object is embedded in your report. If you select Paste Link, the object is linked.

REMEMBER

When a linked object is updated in the OLE server application, it's likewise updated in your report. If the object is embedded, such an update in the server application doesn't affect it.

Integrating Shockwave Flash Objects into Your Reports

Shockwave Flash objects (SWF files) typically contain animations, but can also contain applets. *(Applets* are small programs that perform some operation.)

You can embed a Shockwave Flash object in a report in the same way that you embed an OLE object in a report. Likewise, you can link to a Shockwave Flash object the same way you link to an OLE object. The major difference is that you must choose Flash from the Insert menu rather than choosing OLE Object.

TIP

Flash animations can be annoying, particularly if they are overused. Don't fall into the trap of adding Flash animations to your report just because you can. Animations used sparingly and tastefully can be a plus, but it is easy to go overboard. One possible use in a report might be an animated company logo. Another might be an animation that illustrates a process that is described in the text of the report.

After you tell Crystal Reports that you want to insert a Flash object, the Insert Flash Object dialog box displays. Fill in or browse for the location of your Flash object, as shown in Figure 12-14.

Figure 12-14:
The Insert
Flash Object
dialog box.
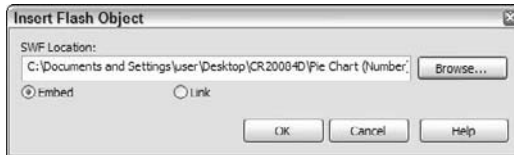
A placement rectangle appears. Deposit the Flash object in an appropriate spot on your report.

You can add SWFs that perform animations to any section of your report. The same is true for some SWFs that execute applets. The exception occurs when an applet extracts data from the report and displays it graphically. This is a major new capability of Crystal Reports 2008. When the data binding capability is used in conjunction with Crystal Xcelsius, the communication power of a report reaches a new level. I discuss using Crystal Reports with Crystal Xcelsius in Chapter 17.

When you *embed* a Flash object in a report, changes to the data bound to the Flash object are dynamically reflected in the Flash display. Chapter 17 is where I discuss data binding. When you *link to* a Flash object, you see a static representation of the object. If the object is updated by its server application, you must close your report and then reopen it to view the changes.

REMEMBER

To test the functionality of Flash objects within a Crystal Report, you must have Flash Player 9 or later installed on your machine. If the report is not being viewed from within Crystal Reports itself, you also need a viewer that supports Flash rendering such as the .NET Web form or the Java DHTML viewer. A default image is associated with each Flash object, and that is what is displayed on a printed report or on one that has been exported.

Chapter 13

Creating and Updating OLAP Reports

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*C*omputer geeks have a maddening tendency to refer to things by in-scrutable acronyms, sometimes even pseudo-acronyms, such as SQL — which, believe it or not, does *not* stand for Structured Query Language. (Read the sidebar on SQL to see why.) The letters in BASIC, FORTRAN, and COBOL once stood for something, as did the letters in the late, lamented SNOBOL. OLAP is a new entry in the list of obscure computer acronyms, but at least it's real. OLAP stands for On-Line Analytical Processing. In this case, the name does bear some resemblance to what the technology is actually about.

OLAP is a form of data mining that enables non-programmers to extract the information they need from an OLAP database. OLAP databases are structured differently from the way ordinary relational databases are structured, in order to make possible the retrieval of desired information using OLAP grids. With Crystal Reports, you can build OLAP grids that operate on OLAP databases, in effect pulling needles out of digital haystacks, without the aid of a formal query language such as SQL.

What's OLAP, and Why Might You Need It?

OLAP is called *On-Line* because it happens in real time, with the user sitting in front of the screen while there's a direct connection to a database. The results of user actions are immediate (more or less). The operation itself is called *Analytical Processing* because its main function is to quickly analyze huge quantities of data and deliver meaningful information to the user. The information arrives in a form that the user can readily comprehend and act on.

What do the letters SQL stand for?

SQL is an industry-standard data sublanguage that descended from a language that IBM developed in the 1970s for its internal use only. The rough prototype language went by the acronym SEQUEL (pronounced the same as the English word), which stood for Structured English QUEry Language. Hey, it made sense at the time; statements in SEQUEL looked a lot like statements in English, but they were more structured.

When IBM released its first relational database product (SQL/DS) in 1981, the Big Blue team wanted to deliver a commercial-quality data sublanguage along with it. They performed a major overhaul on SEQUEL, creating a more robust language. Before release, they discovered that another company had trademarked the name Sequel, so they dropped the vowels, and called it SQL (pronounced *ess-que-ell*).

However, many people persisted in pronouncing SQL as *sequel* — and that was mistake number one. Mistake number two was the assumption that SQL stood for Structured Query Language because SQL is *not* a structured language: It breaks the cardinal rule of structured languages by allowing branches to remote locations. It might be structured English, but it isn't a structured computer language in the sense that computer scientists use that term.

So where does that leave us? Simple: SQL doesn't actually *stand for* anything. Like with C, C++, or C#, it's simply the name of a language — which most people mispronounce and misunderstand — but at least you and I know what they're *really* talking about.

Who uses OLAP?

Huge amounts of data are stored in relational databases belonging to organizations of all sizes and types. You can retrieve information from these databases using queries written in SQL, or by using a graphical approach such as Query By Example (QBE), which gets translated into SQL and then executed. Either way is great — if you're an SQL guru or someone equally skilled in QBE usage.

OLAP is for people who don't even know what a nested SELECT is, let alone a LEFT OUTER JOIN. OLAP is a tool designed for managers who must make decisions based on a needle of information buried in a haystack of data. OLAP gives people who are not database specialists the capability to find that needle quickly.

Creating multidimensional views

A spreadsheet gives you a two-dimensional view of the data you're displaying, as do most reports you create with Crystal Reports. It's the classic row-and-column approach: for example, a company's line items for income and expense arranged in rows, while months or quarters go in columns. Another example is

an instructor's course records: say, student names in rows, and assignment grades and exam scores in columns. Many common situations can be represented very well with these two dimensions. Others, however, require three (or even more) dimensions to convey what the data means.

OLAP is designed to work with these more challenging data sets. A multidimensional OLAP representation of complex data is an *OLAP cube.* Even though the word *cube* implies three dimensions, an OLAP cube can have more than three dimensions. (This does not mean that parts of some OLAP cubes reside in hyperspace. These extra dimensions are conceptual, not spatial.)

What kinds of reporting tasks might require more than two dimensions? Suppose that a company displaying income and expense data by month wants to expand the report to show the data for the past ten years. Income and expense could be one dimension; January through December could be a second dimension; and the years could be a third dimension.

Here's another example. Suppose that an instructor is teaching a distance-learning course with clusters of students meeting in 15 different cities. An OLAP cube could have student names in one dimension, assignment grades and examination scores in a second dimension, and student location in a third dimension. Any application that lends importance to more than two aspects of the data is a candidate for storage in an OLAP cube and presentation in an OLAP report.

Connecting to an OLAP data source

Multidimensional OLAP data is different from ordinary relational data in a relational database. Consequently, you access it differently than you access relational data. Here are the two ways to access OLAP data:

✔ **Directly:** For a direct connection to function, you need an installed OLAP client and some specialized DLLs (dynamic link libraries).

✔ **An Open OLAP gateway:** An Open OLAP connection doesn't require either an OLAP client or any special DLLs. However, it does require a Name Server host that communicates with both Crystal Reports and your OLAP data source.

OLAP Reporting with Crystal Reports

Crystal Reports doesn't create OLAP cubes — the database management system (DBMS) that Crystal Reports is working with does that. Crystal Reports currently creates OLAP reports based on three types of data source.

- ✔ Hyperion Essbase (7.0, 7.1)
- ✔ IBM DB2 OLAP (8.2) Enhanced
- ✔ Microsoft OLE DB Provider for OLAP Services 8.0

TECHNICAL STUFF

The IBM product is actually Essbase in disguise. IBM acquired Hyperion and integrated Hyperion's products into the IBM product line.

Operating on OLAP grid objects

A report containing OLAP data consists of one or more *OLAP grid objects,* which are two-dimensional slices through a three-dimensional cube. Multiple slices give the report a third dimension.

Depending on how you want to look at the data, you might slice a cube in different directions. This process, called *slicing and dicing,* allows you to play with the data until you display it in the most informative way. You can also add dimensions to either the horizontal or vertical axis to analyze three or more dimensions in a single OLAP grid. Alternatively, you can create multiple OLAP grids within a report.

TIP

If you have a choice between building a wide report with many columns across the page and little or no depth, or a report with fewer columns across the page coupled with more depth into the third dimension, take option two. Crystal Reports processes narrow and deep grids faster than it processes wide and shallow ones.

Creating a three-dimensional report

To demonstrate how to create an OLAP report, here's a chance to slice and dice some data from a cube based on the Xtreme database and see what it can tell you. The Business Objects Web site has a sample OLAP cube that you can download named `Sales Reports.cub`. It records the sales, budget, and cost records for a fictitious grocery store chain. You can find it at

```
http://support.businessobjects.com/communityCS/FilesAndUpdates/
              cr_xi_xtreme_report_samples_en.zip.asp
```

This is the same place where you can download the `xtreme.mdb` database. Download the ZIP file if you haven't already done so, and unzip it. In the `en` folder, select Samples, and then select Databases.

The following sections take you through a step-by-step procedure for creating an OLAP report based on the `Sales Reports.cub` cube. You start by specifying a data source. Then you define the grid structure, set sliced dimensions and add pages, apply a predefined style, and finally generate a report.

Specifying a data source

The first step in the process is to tell Crystal Reports where to find the data that the report will be based upon.

1. **From the Crystal Reports Start Page, select the OLAP Cube Report Wizard.**

   The OLAP Data dialog box appears.

2. **Click the Select Cube button.**

   The OLAP Connection Browser appears, showing connected OLAP servers, as shown in Figure 13-1.

3. **If the source of your cube is listed on the OLAP Cube tree, select it and then click Open. If not, click the Add button.**

   When you click Add, the Connection Properties dialog box appears.

4. **In the Connection Properties dialog box (see upcoming Figure 13-2), specify the location of your cube (whether on a remote server, as a local CUB file, or as an HTTP cube on the World Wide Web).**

   To follow along with the example, for Server Type, select Microsoft OLE DB Provider for OLAP Services 8.0.

5. **For Caption, fill in some appropriate identifier for this connection.**

   For this example, type **xtreme cube 1**.

6. **Under Server Options, specify Local Cube file (.CUB) and click the ellipsis button (with three dots) to the right of the File text box.**

   In the Open dialog box that appears, find the `Sales Reports.cub` file. It's located wherever you placed it when you downloaded it.

7. **Select `Sales Reports.cub` and then click the Test Connection button.**

   If all is well, a small OLAP dialog box appear with the cheerful connected successfully message.

8. **Click OK. Back in the Connection Properties dialog box, click OK.**

   At this point, the Connection Properties dialog box should look something like Figure 13-2.
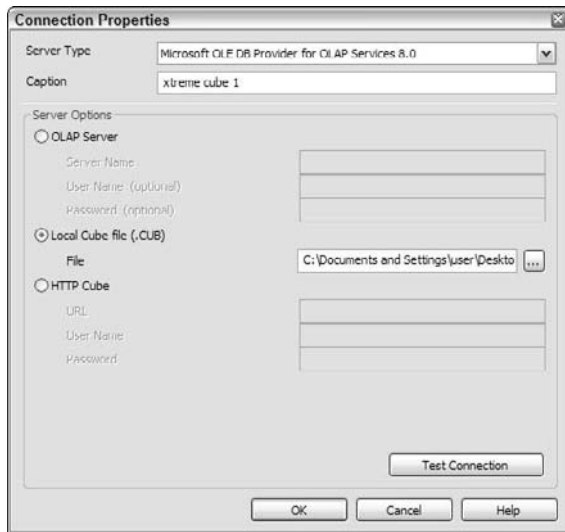
Figure 13-2:
Specify the server that holds your OLAP cube in the Connection Properties dialog box.

You return to the OLAP Connection Browser, which now displays your cube in the tree (showing that the Xtreme cube is connected), as shown in Figure 13-3.
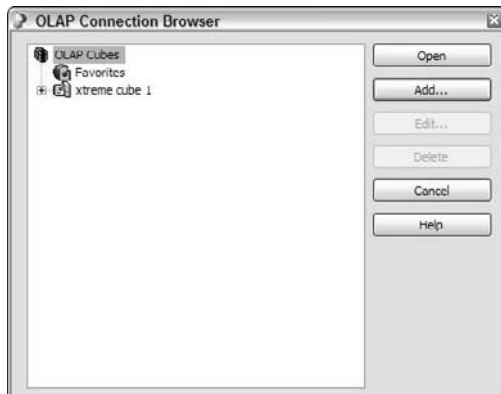
Figure 13-3:
Your new cube is connected.

9. **Click the plus sign to the left of the icon for xtreme cube 1.**

    This drops down to a level named Sales Report.

10. **Click the plus sign to the left of the folder icon for Sales Report.**

    This displays the cube itself, named Sales Report.

11. **Select your cube and then click Open.**

    The OLAP Data dialog box displays, as shown in Figure 13-4.
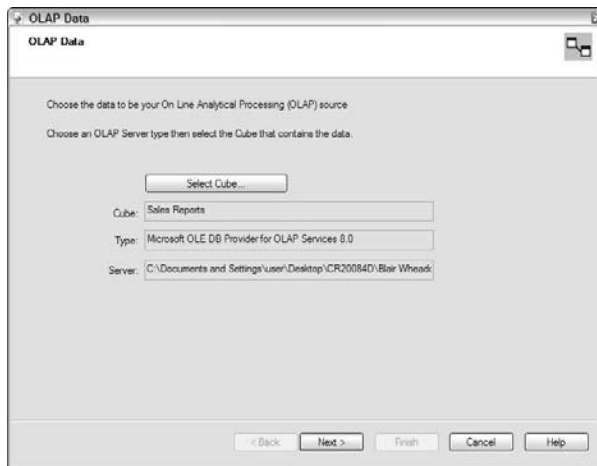
Figure 13-4:
The OLAP
Data dialog
box.

12. **The identifying information about your cube is already filled in. Verify that it is correct and then click Next.**

    The Rows/Columns dialog box appears, as shown in Figure 13-5.
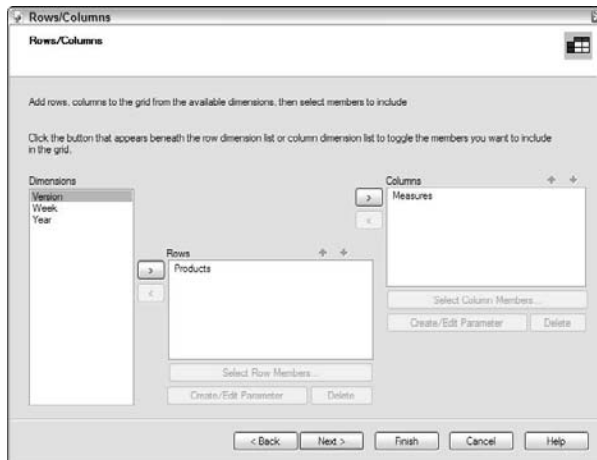
Figure 13-5:
The OLAP
Wizard,
Rows/
Columns
dialog box.

Defining a grid structure

Now structure the OLAP grid the way you want it.

This cube has three dimensions: Products, Sales, and Dates. The wizard suggests that Sales entries (which are things that can be measured) be shown in columns and that Products entries be shown in rows. You want to take a slice through the cube that shows the data for the first week of last year. To do so, leave alone the structure that Crystal Reports has assumed in the Rows/ Columns dialog box, and click Next. The Slice/Page dialog box appears, as shown in Figure 13-6.
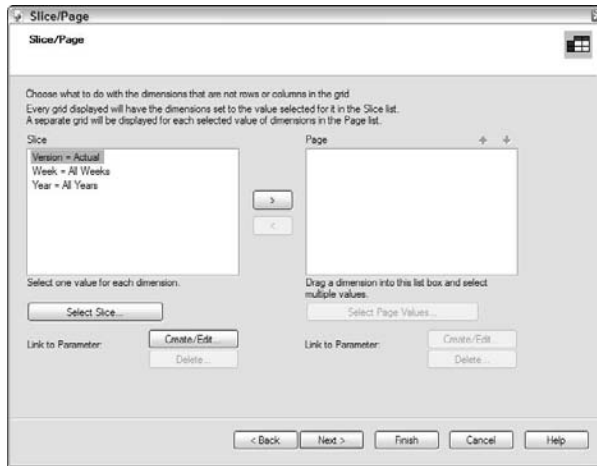
Figure 13-6: Slice/Page dialog box.

Setting sliced dimensions and adding pages

The task here is to specify the timeframe you want the report to cover.

1. **Select Week = All Weeks and then click the Select Slice button.**

   The Member Selector dialog box shown in Figure 13-7 is displayed.

2. **Click the + sign to the left of All Weeks to expand the tree.**

   The tree expands as shown in Figure 13-8.

3. **Select 01 and then click OK.**

4. **Upon returning to the Slice/Page dialog box, select Year = All Years. and then click the Select Slice button.**

   The Member Selector dialog box appears, this time showing All Years.

5. **Click the + sign to the left of All Years to expand the tree.**

6. **Select Last Year, as shown in Figure 13-9, and click OK.**

Figure 13-7:
Member
Selector
dialog box.
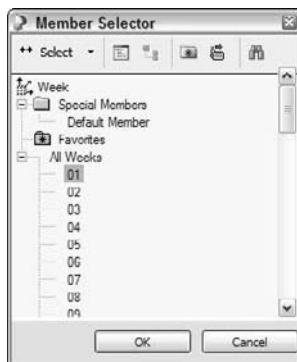
Figure 13-8:
Member
Selector
dialog box,
with All
Weeks
expanded.
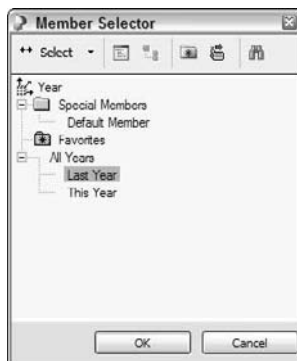
Figure 13-9:
Member
Selector
dialog
box, with
All Years
expanded.

7. Upon returning to the Slice/Page dialog box, click Next.

The Style dialog box opens, as shown in Figure 13-10.
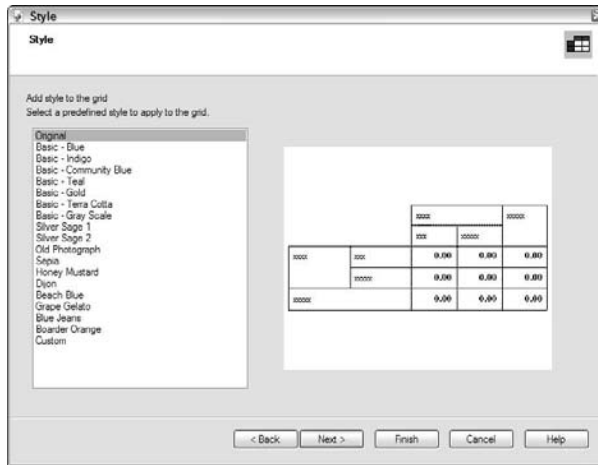
Figure 13-10:
Style dialog
box.

Applying a predefined style

Select a style from the Style dialog box, and then click Next. For this example, I'm going with the simple and classic Original style.

Generating a chart

If you want to include a chart in your report, select a chart type from the Chart dialog box. Fill in the appropriate entries for Chart Type, On Change Of, and Subdivided By. I chose not to include a chart for this example.

Finishing your report

When you have your report set up, click Finish in the Chart dialog box.

A completed report with no associated chart appears, as shown in Figure 13-11. Depending on the complexity of your report and the speed of your computer, this could take some time. Some tweaking is in order; the numbers in the Sales, Cost, and Margin columns are too large to fit in the boxes provided. These are easy to expand, however, by switching to Design view and dragging the right-side handles of the Value fields horizontally to the right.

Adjusting column widths

To adjust the widths of the columns, switch to Design view, which looks something like Figure 13-12.

The OLAP
report
based on
Sales
Reports
cube.
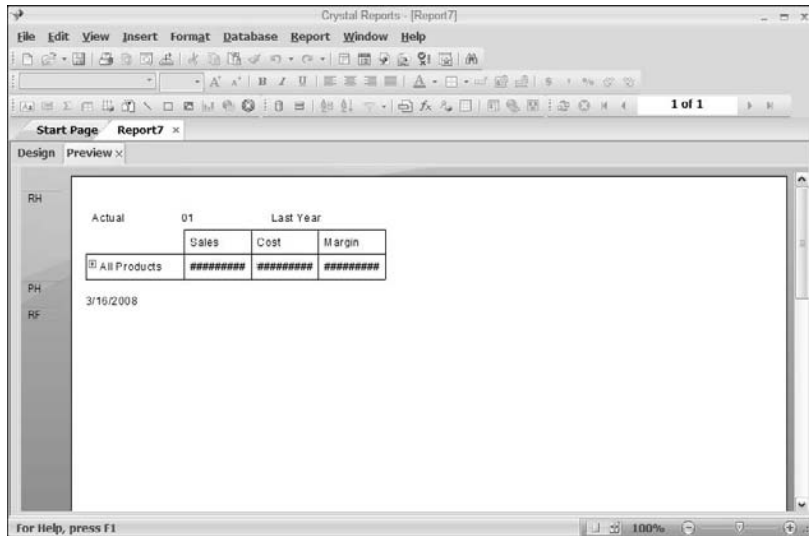
Figure 13-12:
Sales
Reports
OLAP report
in Design
view.
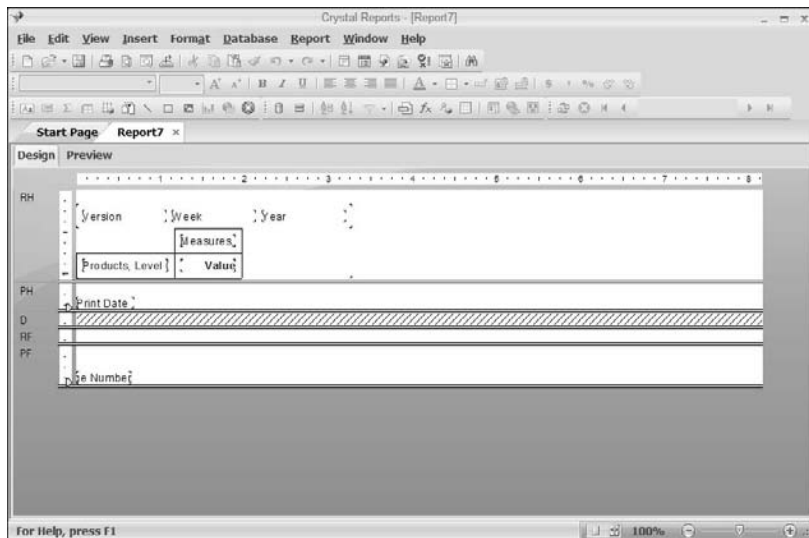
1. **Select the Value text object and expand it to the right by dragging its right drag handle.**

2. **Repeat Step 1 for the Products.Level text object.**

   Your report, in Design view, now looks like Figure 13-13.
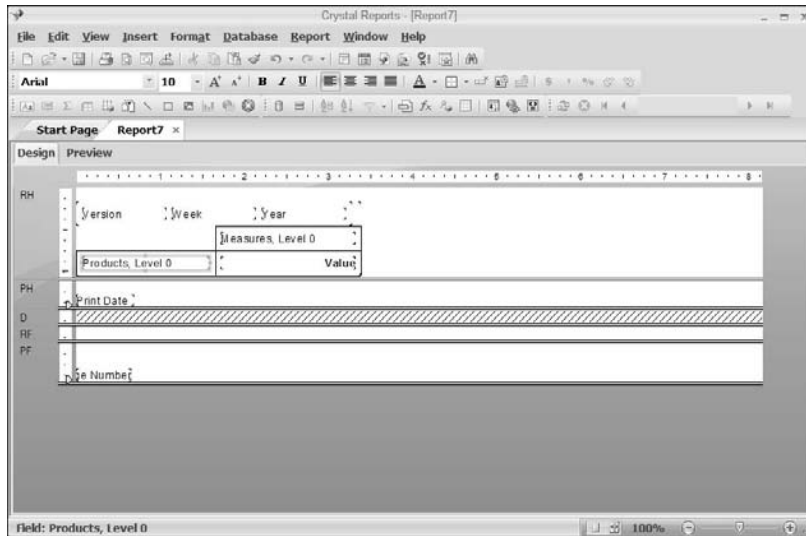
In Preview view, the report now looks like Figure 13-14.

Figure 13-14:
Sales
Reports
OLAP report
in Preview
view,
showing
minimal
detail.

Digging deep for details

Click the + sign to the left of All Products. The All Products category expands to show the breakdown between major product categories. The total Sales, Cost, and Margin figures remain at the top, but now there are individual totals for Bakery, Frozen Goods, Fruits and Vegetables, Grocery, Meat, and Wine and Spirits, as shown in Figure 13-15.

Figure 13-15:
Sales
Reports
OLAP report
in Preview
view,
showing
major
categories.

Now the major product categories also have a + sign to the left. By clicking the + sign at each level of detail, you can delve down to a deeper level. Figure 13-16 shows the result of expanding the Bakery category, and Figure 13-17 goes one level deeper.

Figure 13-16:
Sales
Reports
OLAP report
in Preview
view,
showing
Bakery
detail.

An OLAP report can be a powerful tool for analyzing multidimensional data, enabling decision makers to make better decisions, based on a better understanding of the facts.

Updating an OLAP Report

Because an OLAP report is based on an OLAP cube created by a database management system, any change in the underlying cube could cause errors in the production of the report. The report might even come out blank if, for example, the location of the OLAP cube has changed, and Crystal Reports can no longer find it. Other problems occur if a dimension has been removed from the cube or a field used by the report is removed.

To reconnect a report to a cube whose location has changed, perform the following steps:

1. **In the report, select the grid by right-clicking within the border.**

2. **From the menu that pops up, choose Set OLAP Cube Location.**

   A dialog box appears, reading, "Warning: It is not possible to undo this command. Would you like to perform the command anyway?"

3. **If you're sure that your OLAP cube location has changed and that your report is no longer valid, click Yes.**

   The Set OLAP Cube Location dialog box appears, displaying what Crystal Reports currently thinks the cube location is.

4. **Specify the new OLAP Server location by clicking Select and then use the Crystal OLAP Connection Browser that appears to locate the cube.**

   The Connection Properties dialog box displays.

5. **Select the new cube location and click Open.**

6. **In the Set OLAP Cube Location dialog box that appears, click OK.**

   Your OLAP cube is now reconnected to its source database at its new location.

Formatting Data in an OLAP Report

You can do a number of things to enhance the appearance of an OLAP grid. Often such enhancements make it easier to convey the important facts contained in the grid. As I mentioned earlier, you can easily change the width and height of the grid cells by moving to Design view, selecting them, and then dragging the cell handles to give the cell the desired dimensions.

You can do lots of other things:

- **Highlighting Expert:** You can use Highlighting Expert to apply conditional formatting to the grid fields. Access Highlighting Expert by right-clicking the field you want to format, and then choosing Highlighting Expert from the contextual menu that pops up. See Chapter 8 for more about Highlighting Expert.

- **Format Editor:** You can use Format Editor to apply absolute formatting to fields in the grid. For this function, right-click the field you want to format, and choose Format Field from the contextual menu. Chapter 8 covers Format Editor.

- **Formula Workshop:** You can use Formula Workshop to create your own custom formula for conditional formatting. This can be as elaborate and obscure as you like. Formula Workshop is the most powerful tool for controlling formatting of an OLAP grid. I cover Formula Workshop in depth in Chapter 10.

- **OLAP Expert:** You can use OLAP Expert to reformat the entire OLAP grid. It can do everything that the OLAP Report Creation Wizard can do, plus a couple of additional functions. One of the many things you can do with the OLAP Expert is to change a dimension's background color.

Changing a dimension's background color

Here's how to change the background color of one of the dimensions of the OLAP grid that I show you how to create earlier, as shown in Figure 13-8.

1. **Invoke OLAP Expert by right-clicking in the upper-left corner of the grid and choosing OLAP Grid Expert from the contextual menu that appears.**

   OLAP Expert appears. At this point, all the identifying text fields should be filled in, as shown in Figure 13-18.
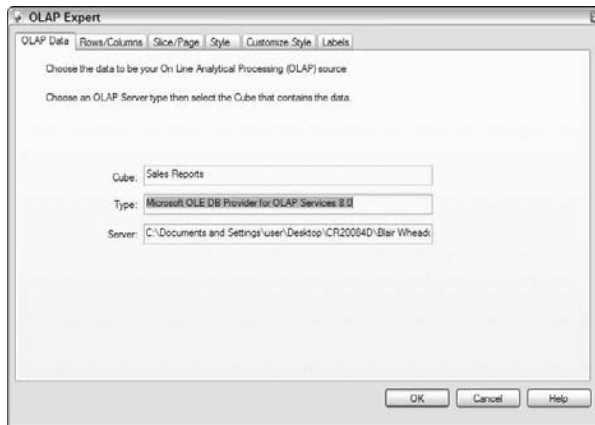
2. **Click the Customize Style tab.**

   Figure 13-19 shows what this looks like. Note that the background color for the Product Name, Level 0 group option is set to Custom.

3. **Pull down the Background Color menu and choose the color you want for the background of the Product Name columns.**

For this example, I chose aqua.

4. **Click OK.**

Figure 13-20 shows the result. The Level 0 product column now has a background color of aqua. The Level 1 background column is unaffected, as are the other areas of the grid. Of course in this book, you cannot tell that the background color has changed to aqua. However, you *can* tell that it has changed to something other than white. Take my word for it. I am looking at it on a color screen. The Level 0 background color has changed to aqua.

Figure 13-20: The level 0 Product column now has a background color.

Creating an alias for a dimension

Dimension names come from their source cube, so they're not under your control. These dimension names could be extremely long, making them tedious to include in formulas. To remedy this, you can substitute an alias for a dimension name.

1. **On the Customize Style tab of OLAP Expert (refer to Figure 13-19), select the dimension for which you want to create an alias.**

2. **With the dimension selected, in either the Rows or Columns boxes, enter the alias name in the Alias for Formulas field.**

3. **Click OK.**

   You can now use your shorter alias in any formulas involving that dimension.

Formatting grid lines

The default grid lines that define the rows and columns of the grid are fine for most applications. However, you have the flexibility of either displaying the grid lines or not, as well as selecting their color, style, and width.

1. **On the Customize Style tab of the OLAP Expert (refer to Figure 13-19), click the Format Grid Lines button.**

   The Format Grid Lines dialog box appears, with a layout of a sample grid, as shown in Figure 13-21.
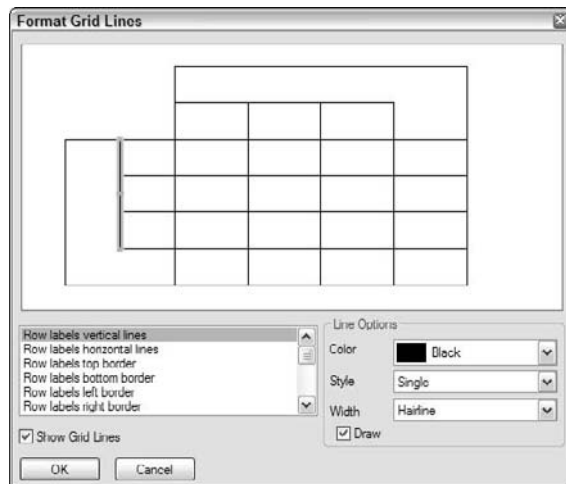
Figure 13-21: The Format Grid Lines dialog box.

2. **In the list on the left, specify the row label attributes, column label attributes, or cell attributes that you want to change. Alternatively, you can select the line you want to change by just clicking it.**

3. **From the pull-down menus on the right, specify the color, style, and line width that you want for the specified attributes.**

4. **When the grid image in the top part of the dialog box matches what you want, click OK.**

   I chose solid red lines, with a line width of 2 points, giving me the appearance shown in Figure 13-22. Actually, you probably can't tell that the lines

are red. You might be able to discern that they are not as dark as black lines would be. You should certainly be able to tell that they are thicker than the standard hairline grid lines.
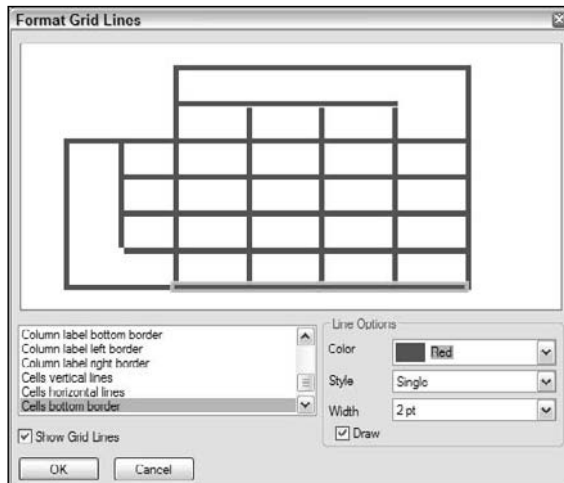
Figure 13-22:
Grid lines
have been
formatted.

Labeling dimensions

You can control which dimensions are labeled and which remain unlabeled. Use the Labels tab of OLAP Expert to display labels. Figure 13-23 shows the Labels tab.
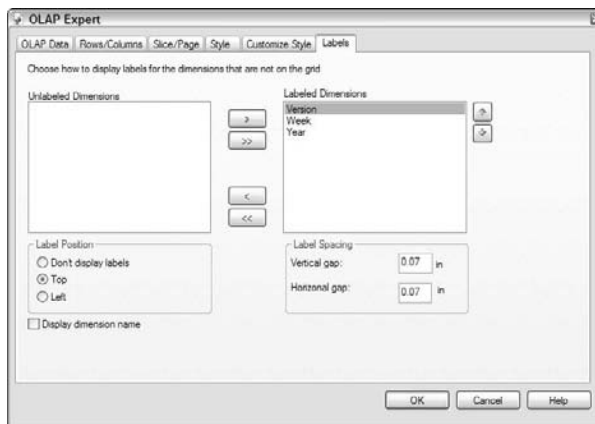
Figure 13-23:
The Labels
tab of the
OLAP
Expert.

As you can see, you can choose which dimensions are labeled and which are not. You can also choose where to position a label as well as the vertical and horizontal spacing between labels.

Changing Data Appearance in an OLAP Report

You can change quite a few things in Preview mode. Some of these are discussed in the previous section. Others are discussed in this section. You can also make changes in Cube view. To take a look at Cube view, right-click in the upper-left corner of the grid to display the shortcut menu. From the menu, choose View Cube. The cube from which your grid is derived displays. It most likely looks something like the cube I have been using in the examples so far, as shown in Figure 13-24.

In this section, I stick to describing the changes you can make in Preview mode. You may never have to exercise the advanced capabilities available in Cube View mode.

Figure 13-24: The Sales Reports cube.

Showing and hiding dimensions

Suppose you want to hide a dimension to reduce potentially confusing clutter in the grid.

1. **Right-click the dimension of the members you want to hide.**

   In this example, I right-click Bakery.

2. **From the shortcut menu, choose Collapse Member.**

   The details disappear, as shown in Figure 13-25.
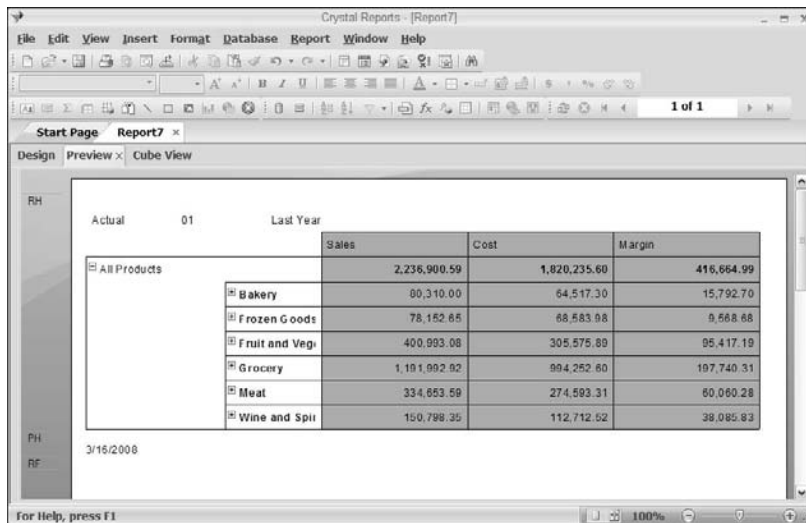
You can expand a dimension in a similar manner.

1. **Right-click the dimension of the members you want to show.**

   I right-click the Bakery cell.

2. **From the shortcut menu, choose Expand Member.**

   The details now show, as shown in Figure 13-26.

Figure 13-25: A dimension has been hidden.

Adding totals to an OLAP grid

You can add totals to a grid with the following steps:

1. **Right-click the dimension that you want to total.**

   For this example, I right-click in the Sales cell.

2. **From the shortcut menu, choose Automatic Totals.**

3. **From the submenu that appears, choose Rows (Across).**

   The amounts in the rows are now totaled, and the totals are displayed in the grid, as shown in Figure 13-27.

Pivoting an OLAP grid

To exchange the roles of rows and columns, you can pivot the OLAP grid. Right-click the border of the grid to display a shortcut menu. From the menu, choose Pivot OLAP Grid. This flips the grid, as shown in Figure 13-28.

Figure 13-27: The grid now contains row totals.
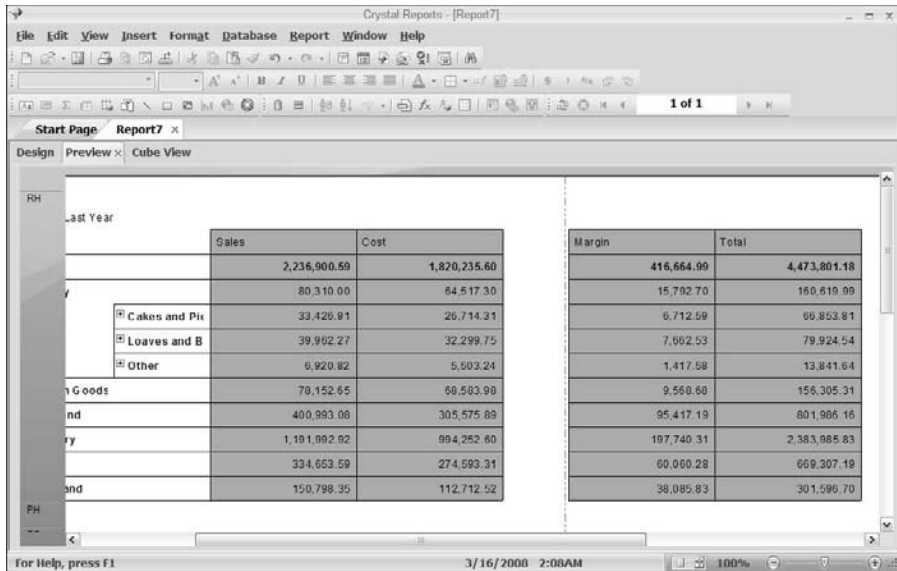
Figure 13-28: OLAP grid after pivot operation.
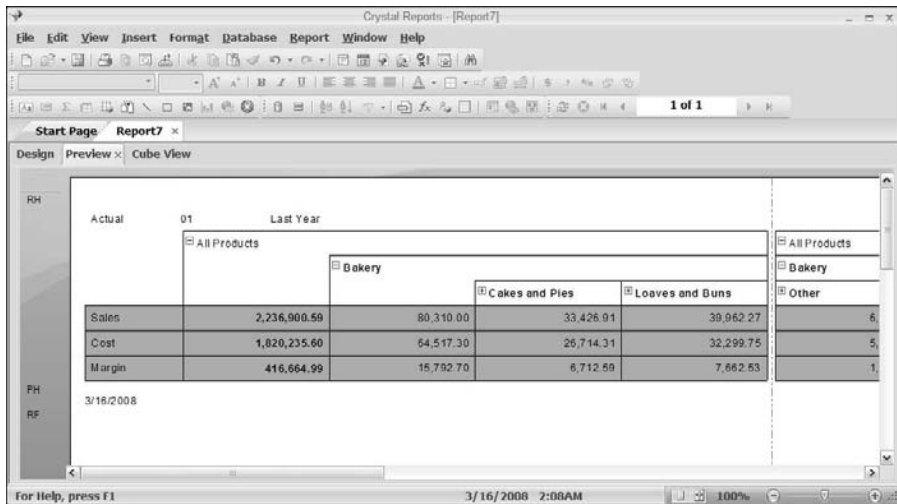
Reordering fields

You can change the order of the members in the grid, either rows or columns. Here's how:

1. **Expand the row or column that you want to reorder. (Refer to Figure 13-26.)**

I picked the Frozen Goods cell.

2. **Right-click the dimension you want to reorder to display its shortcut menu.**

3. **From the menu, select Reorder Displayed Members.**

   The Reorder Displayed Members dialog box appears, as shown in Figure 13-29.

Figure 13-29: The Reorder Displayed Members dialog box.
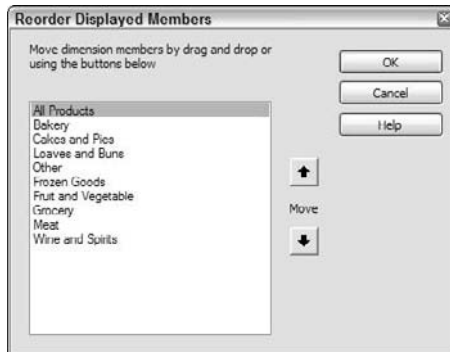
The customers are displayed in the order they hold in the cube.

4. **Select an individual member, such as Frozen Goods, and then move it up or down in the list, using the up and down arrows to the right of the list of members.**

5. **When you have the members arranged the way you want, click OK.**

   The OLAP grid reflects your revised ordering.

Sorting data

In addition to rearranging individual rows and columns in a grid, you can also sort rows and columns based on the values they contain. You can easily add multiple sorts to a grid, and just as easily edit or delete them.

1. **To add a sort to a grid, right-click the desired row or column member.**

2. **From the shortcut menu that appears, choose Add First Sort.**

   A submenu appears with options:

   • Ascending

   • Descending

- Ascending, Break Hierarchies
- Descending, Break Hierarchies

3. **Choose one of the submenu options.**

   The arrangement of items changes.

You can change the direction of a sort or remove a sort from the shortcut menu. You can also pile one sort upon another, sorting first on one member and then on others. You can either retain the Level 0/Level 1 hierarchy to keep related members together, or break that hierarchy to sort things without regard to group membership.

Filtering data

You can filter data to exclude data from the grid that is not important for your purposes. For example, you could filter out the top or bottom N members, or the top or bottom N percent of members.

1. **Right-click the field that you want to filter.**

2. **From the shortcut menu that appears, choose Add Filter.**

   The Define Filter dialog box appears, giving you three choices in the Filter Type area: Actual Values, Top / Bottom N, and Top / Bottom N%.

3. **Select a filter type.**

4. **In the Filter Definition area, select either Show Rows or Hide Rows and specify a condition, such as *Cell value is less than 1000*.**

5. **Click OK.**

Making calculations

You can add calculations to an OLAP grid, using values in the grid as operands. The results of the calculations are added to the grid as extra rows or columns. Quite complex calculations are possible.

Chapter 14

Using Cross-Tab Reports to Mine Your Data

*F*or some people, a summarization of one sort or another is far more valuable than reams of detailed data. However, reports with summaries in a Group Footer or the Report Footer don't always display summaries in a form that is good for comprehension and decision making. In some of these cases, a *cross-tab* object can present the data in a form that's both easy to understand and capable of conveying the *significance* of the data.

The main advantage of using a cross-tab is that it can put multiple summaries together in a compact form. You can draw inferences from a single cross-tab on a single page, which displays separate summaries that are nonetheless related.

Creating a Cross-Tab Object to Summarize All Report Data

Suppose that the Sales Manager at Xtreme Mountain Bikes would like to see how the various product categories are contributing to total sales volume in Canada. A cross-tab report is ideal for presenting that information in a way that can be easily viewed and comprehended. Follow these steps.

1. **From the Crystal Reports Start Page, select Cross-tab Report Wizard.**

   The Cross-Tab Report Creation Wizard appears, showing available data sources.

2. **Select the Customer, Orders, Orders Detail, Product, and Product Type tables from the `xtreme.mdb` database.**

3. **Move the tables to the Selected Tables pane.**

4. **Click Next to display Link view.**

   Link view shows the five tables connected to each other by the fields that they have in common.

5. **Click Next to display the Cross-tab view of the Cross-Tab Report Creation Wizard, which is shown in Figure 14-1.**

Figure 14-1:
The Cross-tab Report Creation Wizard, showing tables that you selected.
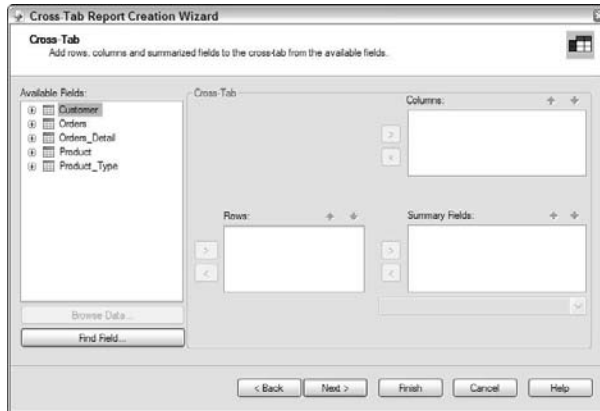
6. **In the Available Fields pane, expand the Customer node and select Region. Then click the right-facing arrow to the left of the Rows pane.**

   Each row of the cross-tab now corresponds to a region (in this case, a province of Canada).

7. **In the Available Fields pane, expand the Product_Type node, and drag Product Type Name to the Columns pane.**

   Each column of the cross-tab now corresponds to a product type.

To get the report to make the specific summaries you want, follow these steps:

1. **In the Available Fields pane, expand the Orders node. Drag Order Amount to the Summary Fields pane.**

The default value in the pull-down list below the Summary Fields pane displays Sum, which is the type of summary you want for this report.

2. **Click Next to display Chart view.**

   You can add a bar, line, or pie chart to the report, if you want.

3. **Select Bar Chart to see what it will give you.**

   When you select a chart type, the wizard suggests a chart title that you can override if you want. It also asks that you verify several other assumptions it has made about what you want the chart to show.

4. **Change the Chart Title to Sales by Province and Product Type, as shown in Figure 14-2.**
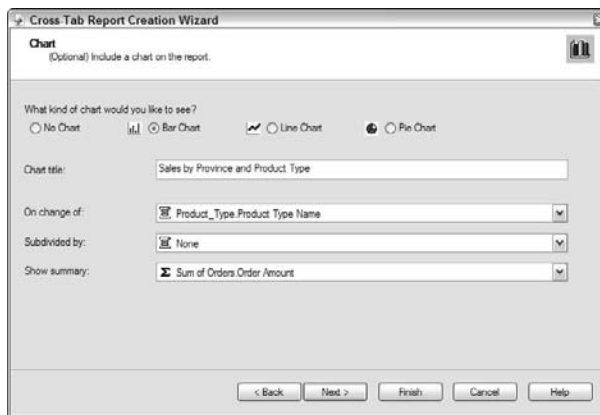
Figure 14-2: Chart view of the wizard, with descriptive chart title.

5. **Click Next to display Record Selection view.**

   For this report, you want to deal with records only from Canadian customers.

6. **In the Available Fields pane, expand the Customer node and move Country to the Filter Fields pane. In the pull-down lists that appear below the Filter Fields pane, select *is equal to* and *Canada*.**

7. **Click Next to display Grid Style view, which is shown in Figure 14-3.**

   A good assortment of styles is available, some more appropriate than others for various kinds of reports.

8. **Retain the Original style, and then click Finish.**

   The report is displayed in Preview mode. The upper part of the report is shown in Figure 14-4.

Figure 14-3:
Grid Style view of the wizard, showing a mock-up of the Original style.
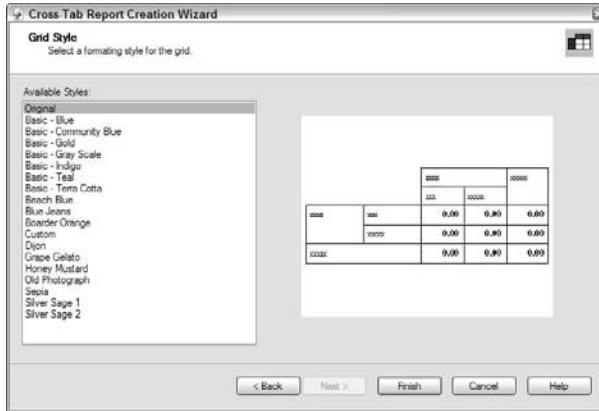
Figure 14-4:
The top of the cross-tab report.
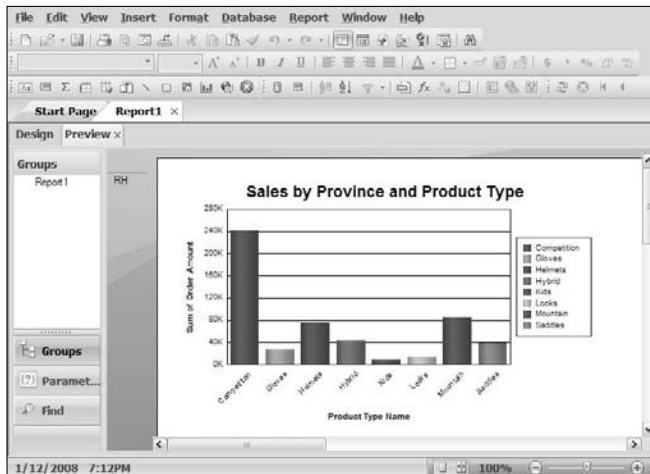
9. **Save the report.**

   For this example, save the report as `Sales by Province`. You'll use this report later.

This chart should be of interest to the Sales Manager. It shows that competition bikes are outselling mountain bikes by a factor of almost three to one. It also shows that Xtreme is deriving almost as much revenue from the sale of helmets as it is from the sale of mountain bikes. This kind of information can be a great help to decision-makers.

Moving down the page to the actual cross-tab report shown in Figure 14-5, you can see that most sales are coming from British Columbia. This information might also be important to the Sales Manager.

Figure 14-5:
Main part of the cross-tab report.

The overall totals for each province are off the screen on the right edge of the report, with a grand total in the bottom-right corner. Also notice that the sales total for competition bikes for British Columbia and the overall total are so large that they don't fit in the space allotted, and are replaced by # signs. One solution to this is to reformat that column to make it wider. I cover formatting later in this chapter. At any rate, with this cross-tab object and its accompanying chart, the manager can quickly grasp the overall situation and make valid decisions.

Summarizing the Contents of a Group with a Cross-Tab

As you can see in the preceding section, you can add cross-tabs to a Report Header or Report Footer. This section shows you how to add cross-tabs to a Group Header or Group Footer.

REMEMBER

You can't put a cross-tab in page headers, page footers, or the Details sections.

The section in which a cross-tab object is located in a report is related to the data it contains. For example, if the cross-tab should include all the data in

the database for customers in Canada, as in the preceding section, the cross-tab must be located in either the Report Header or the Report Footer. This makes sense: The displayed data is a summary of data from all the Canadian provinces, so it must appear in a report section that encompasses data from all those provinces.

You can also create individual cross-tab objects for each group in a report. For example, you could create a report similar to the preceding one, but with summaries for each province rather than one overall summary for all of Canada. Follow these steps:

1. **From the Crystal Reports Start Page, select Report Wizard.**

   Because there's more to this report than just a cross-tab, you use the Standard Report Creation Wizard (rather than the Cross-Tab Wizard) to create the report.

2. **Place the Customer, Orders, Orders Detail, Product, and Product Type tables in the Selected Tables pane.**

3. **Click Next to display Link view.**

   The links between these tables are straightforward, so the wizard has assumed them correctly.

4. **Click Next to display Fields view.**

   Your report won't include any fields other than those in the cross-tabs, so there's no need to select any fields here.

5. **Click Next to display Template view.**

   You won't use a template, either.

6. **Leave the default choice (No Template) intact; click Finish.**

   This creates a report with nothing in it but a date and a page number.

To continue building the report

1. **Switch to Design mode.**

2. **Expand the Print Date field in the Page Header to make it big enough to display a date in a long format.**

3. **Add a text field in the Report Header to hold the report title.**

   Here's how:

   a. *On the Insert Tools toolbar, click the Insert Text Object icon and then place the text rectangle in the Report Header.*

   b. *Expand the rectangle across the entire width of the page, and then type the report title.*

To follow along with the example, type **Sales of Product Types by Province**.

    c. On the Formatting toolbar, click the Align Center icon to center the text.

    d. Enlarge the font and make it bold to make it more readable.

4. On the Expert Tools toolbar, click the Group Expert icon.

The Group Expert dialog box appears.

5. Expand the Customer node and then move Region over to the Group By pane. Click OK.

Group Header 1 (GH1) and Group Footer 1 (GF1) are created.

6. Drag the bottom boundary of the Group Header section down to make room for the cross-tab you will place there.

7. On the Insert Tools toolbar, click the Insert Cross-Tab icon.

Drag the placement rectangle that appears into group header GH1 and release it with a mouse click.

8. If it's not already visible, display Field Explorer so that you can select database fields from it to place into your cross-tab.

Figure 14-6 shows the screen at this point.

9. Select Customer Name from Field Explorer and drag it onto the cross-tab object, and then place it at the lower left-hand corner.

This makes Customer Name the item displayed in the rows of the cross-tab. Figure 14-7 shows the cross-tab object after you do this step.

Figure 14-6: An empty cross-tab has been placed into group header GH1.
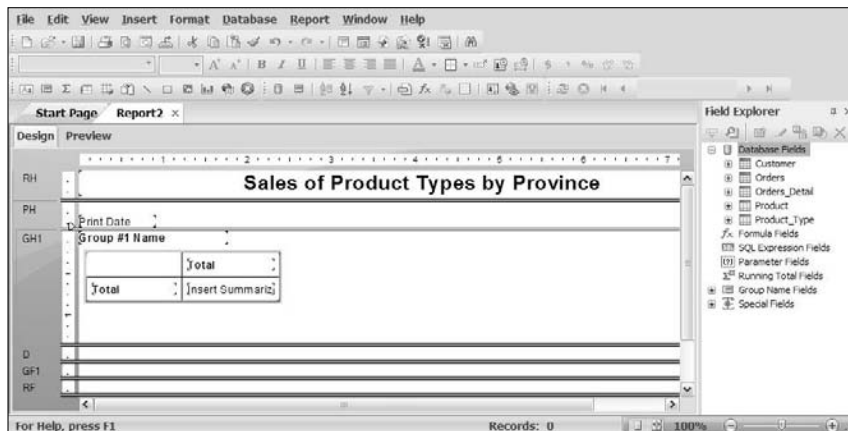
Figure 14-7:
Cross-tab
object after
rows have
been
specified.

Figure 14-8:
Cross-tab
object after
columns
have been
specified.
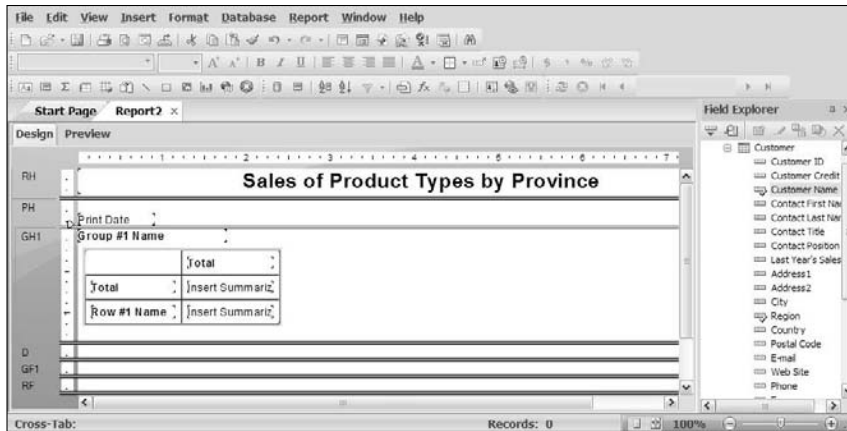
10. **In Field Explorer, drag Product Type Name from the Product_Type table onto the cross-tab object, at the upper-right corner.**

    This establishes the columns of the cross-tab. Figure 14-8 shows the cross-tab object after this is accomplished.
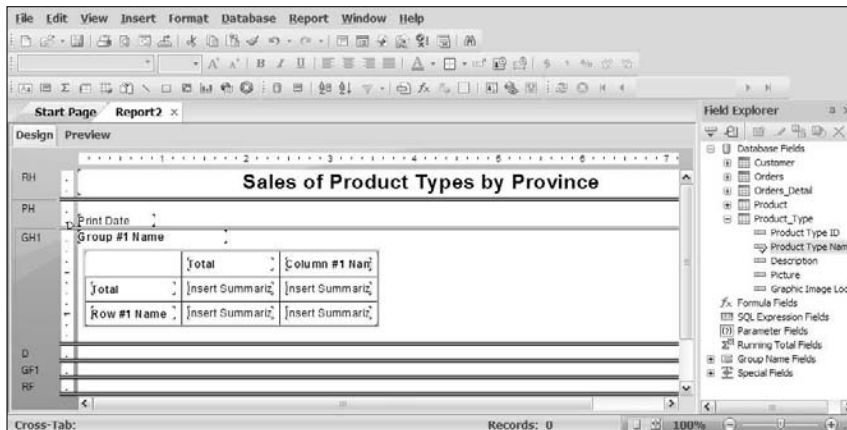
11. **Drag Order Amount from the Orders table in the Field Explorer into the Insert Summarized Field Here cells.**

    Your cross-tab object should look like Figure 14-9.

12. **Switch to Preview mode.**

    The report looks like the one shown in Figure 14-10.

Figure 14-9:
The
structure of
the cross-
tab object is
now fully
specified.
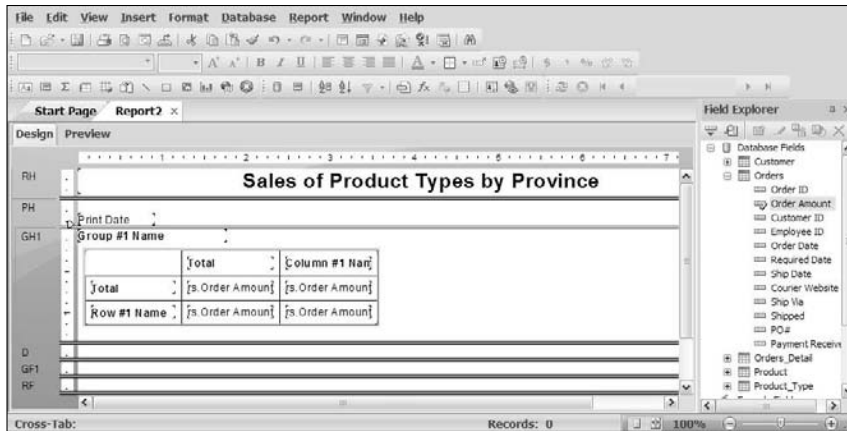
Figure 14-10:
Cross-tab
report, first
version.
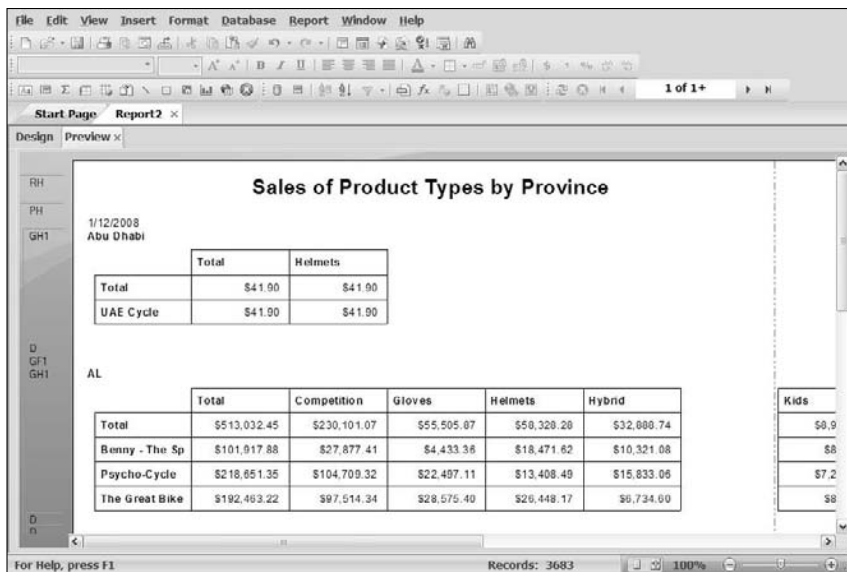
You have cross-tabs all right, but they're not the ones you want. The first is
for the customer in Abu Dhabi, and the second is for customers in Alabama.
There are more than 3,600 records. You want the report to show only cus-
tomers in Canada. To do that, you have to work on the report just a little
bit more:

1. **On the Expert Tools toolbar, click the Select Expert icon.**

   The Choose Field dialog box appears.

2. **Expand the Customer node, select Country, and then click OK.**

   The Select Expert dialog box appears, with the Customer.Country tab on top.

REMEMBER

3. **From the pull-down lists, select *is equal to* and *Canada*. Click OK.**

   You want to select only Canadian customers.

4. **When the dialog box asks whether you want to use saved data or refresh the data, click one of the options.**

   In this case, it doesn't matter which you choose because the database has not changed since the last time you ran the report.

   The report, which is shown in Figure 14-11, now contains only Canadian customers, but there's a formatting problem. Below the cross-tab for British Columbia, you can see a large number of detail lines indicated in the left margin — all empty. Get rid of them so the cross-tabs for all provinces are displayed one below another.

5. **Right-click in the area to the left of the Details section and choose Suppress (No Drill Down) from the contextual menu that appears.**

   The report shown in Figure 14-12 appears. The data for Manitoba is right below that for British Columbia, and the data for Nova Scotia is right below Manitoba's. This is what you want.

6. **Save this report as Sales of Product Types by Province.**

Figure 14-11: Cross-tab report, second version.

Figure 14-12:
Cross-tab report, final version.

Making Calculations within a Cross-Tab Row or Column

Suppose you want your report to show the result of a calculation based on the data in the report. You can do this by creating a Calculated Member. For this example, suppose you want to display the totals of gloves and helmets combined, for all the customers in your report. Follow these steps:

1. **In the cross-tab, right-click the Gloves column header.**

2. **From the shortcut menu that pops up, choose Calculated Member.**

3. **From that submenu, choose Select "Gloves" as first value.**

   A dialog box appears and tells you that you have just selected the first value for a predefined calculation.

4. **Click OK.**

5. **Right-click the Helmets column header.**

6. **From the shortcut menu, choose Calculated Member.**

7. **From that submenu, choose Sum of "Gloves" and "Helmets."**

   A dialog box appears telling you that you have just added a calculated row/column.

8. **Click OK.**

   A new column appears in the cross-tab to the right of the Helmets column. It contains the sum of the values in the Gloves and the Helmets columns.

   Figure 14-13 shows the report as it now looks.

Enhancing the Appearance and Readability of a Cross-Tab Object

You can do a number of things to enhance the appearance of a cross-tab report. This section experiments with achieving different effects in the reports I show you how to create earlier in this chapter.

Changing the width and height of cross-tab cells

The width and height of cross-tab cells are easy to change in Design mode. Merely select the cell you want to change and then drag its width or height handle in the direction you want. If you drag a width handle, all the cells in that column are changed along with the cell you're dragging. If you drag a height handle, all the cells in the same row are changed in the same way. This

retains size consistency across columns and rows. It's not uncommon to need to enlarge cells to display all that they contain because the default size assigned by the Cross-Tab Wizard is often not adequate.

Formatting entire rows and columns

You can apply formatting to an entire cross-tab object by right-clicking the blank area at the top-left corner of the object and choosing Format Cross-Tab from the menu that pops up. The Format Editor dialog box appears, as shown in Figure 14-14.

You can specify various attributes such as Read-Only and Lock Position and Size. By switching to the Border tab, you can also specify refinements such as border lines, drop shadows, and foreground and background colors. From the Hyperlink tab, you can associate your cross-tab with a Web site, an e-mail address, or a disk file.
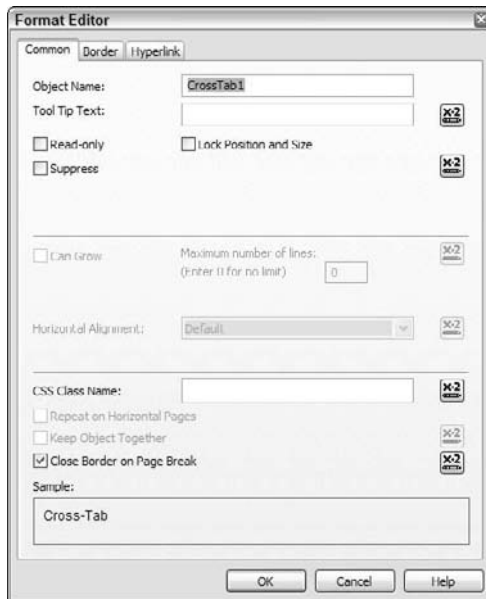
Figure 14-14:
Format
entire
cross-tab
objects
here.

Formatting individual fields

To format an individual field, right-click it and choose Format Field. This displays a version of the Format Editor tailored to the data type of the field you're formatting. For example, a currency field displays font options and currency format options in addition to the Common, Border, and Hyperlink options that appear when you're formatting an entire cross-tab.

You can give multiple cross-tab cells the same formatting by selecting them simultaneously by Shift+clicking, and then applying formatting in the same way you would for a single cell.

Suppressing selected cross-tab data

Sometimes the cross-tab objects you create might contain empty rows or columns because no data is available to fill them. For readability, you might want to suppress these empty rows and columns. To do so, right-click the blank area in the upper-left corner of the cross-tab object and choose Cross-Tab Expert. One of the tabs for this Expert is Customize Style. Click that to display the dialog box shown in Figure 14-15.

The lower-right portion of the dialog box shows that you can suppress not only empty rows and columns, but also row and column grand totals. A variety of other customizations are also available.
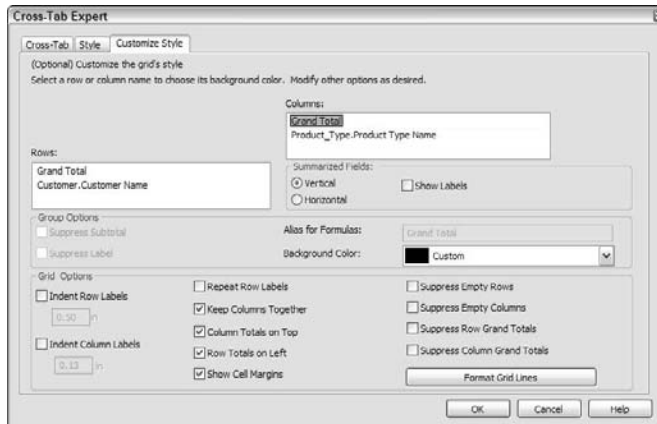
Figure 14-15: Suppress the display of empty rows and columns.

Printing cross-tabs that span multiple pages

Commonly, a cross-tab object is wider or longer than the specified page size. Crystal Reports automatically formats the report on as many extra *(extension)* pages as needed. Column headings are repeated on all such extra pages. By default, row labels are not repeated. If you want row labels to be repeated on extension pages, select the Repeat Row Labels option on the Customize Style tab of Cross-Tab Expert (refer to Figure 14-15).

Chapter 15

Enhancing Reports with Charts

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*T*he essential purpose of a report is to communicate meaning to its read-ers. Lines of text and columns of numbers undeniably communicate meaning, but sometimes they don't do so as forcefully as a visual image. The right picture can sometimes be worth much more than a thousand words.

Crystal Reports delivers information visually in several ways. In several of the previous chapters, I told how to include a company logo in a report. You can use the same technique to include a wide variety of graphical images. In Chapter 16, I discuss adding a visual dimension to geographical information with maps. In this chapter, I tell you how to add charts to a report. Charts are probably the most popular method used to convey an overview of data that might otherwise be difficult to interpret. Trends in the data clamor to be recognized. Anomalies are much more noticeable than they would be, buried in a column of numbers. If your report contains numerical values of any kind, it would probably benefit from the inclusion of one or more charts.

Using Chart Expert

The tool you use to create all the charts is Chart Expert. You can open Chart Expert by clicking the Insert Chart icon on the Insert Tools toolbar or by choosing Insert⇨Chart from the main menu. Either method calls up the Chart Expert dialog box.

Type tab

The first tab on the left when you first open Chart Expert is the Type tab (see Figure 15-1).

From this tab, you can select the type of chart you want to include in your report. As you can see, 12 different bar charts are available (three 2-D vertical, three 2-D horizontal, three vertical with depth effect, and three horizontal with depth effect). The other types of charts have multiple variants as well.

When you select the Vertical option, the bars rise vertically from the bottom of the chart. When Horizontal is selected, the bars move horizontally from left to right. These options don't appear when you select a chart type that doesn't distinguish between vertical and horizontal (such as a pie chart).
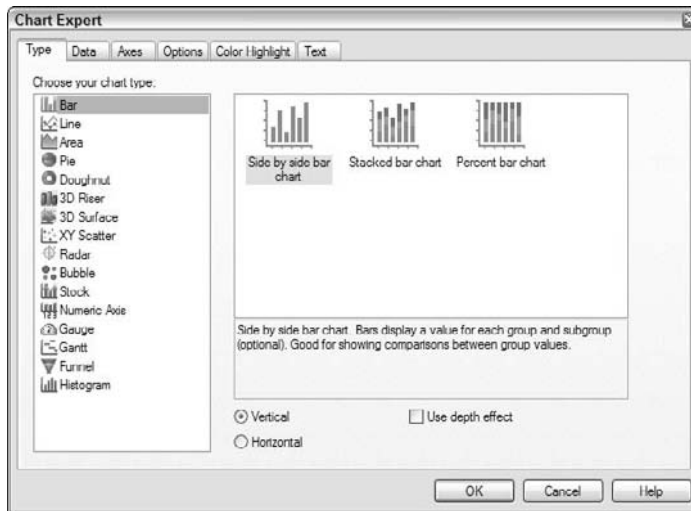
Figure 15-1:
The Type tab, Chart Expert.

Data tab

The Data tab, which is shown in Figure 15-2, has two areas: Layout and Data. The Layout options are described in the later section, "Different Chart Layouts for Different Data Types." In the Data area, you specify what data to show in the chart and what event will trigger the chart display. The triggering event is the change in the value of some field.
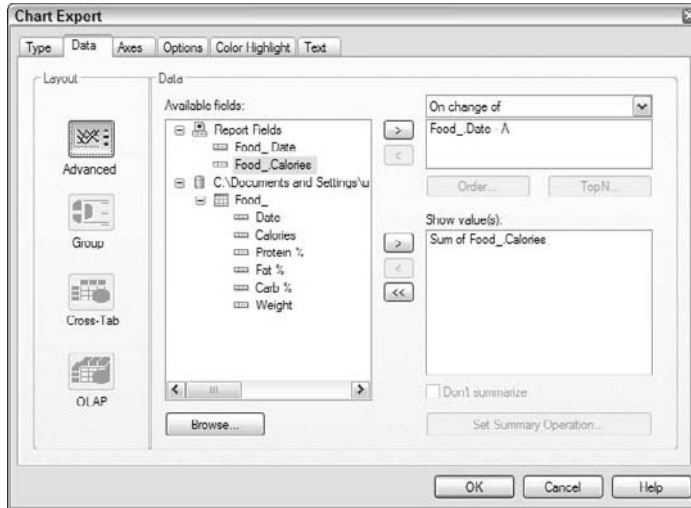
Figure 15-2:
The Data
tab, Chart
Expert.

Axes tab

The Axes tab relates to only some of the chart types. It gives you the option
of showing gridlines on the chart, scaling the axes, and indicating the number
of divisions displayed. Figure 15-3 shows the Axes tab.
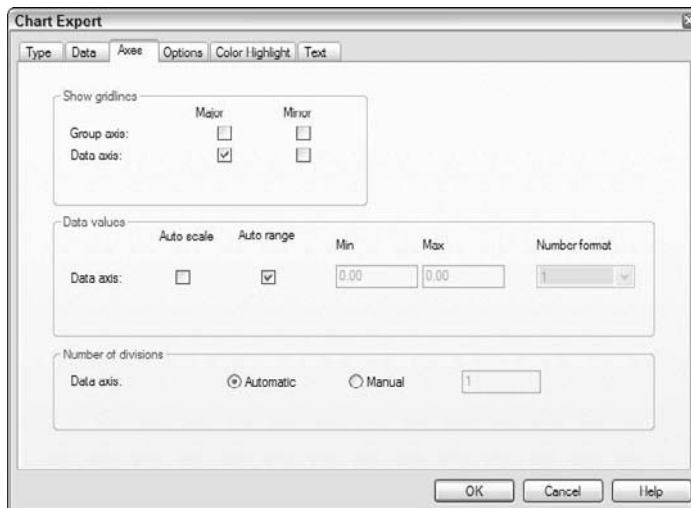
Figure 15-3:
The Axes
tab, Chart
Expert.

Options tab

The Options tab is shown in Figure 15-4. The areas on this tab are Chart Color, Data Points, Customize Settings, Layout, and Legend. You can specify a chart color of either Color or Black and White. Black and White, for use with grayscale printers, uses different patterns to show the different areas.

TIP

Even if you have a grayscale printer, it might be better to specify color anyway. The different colors show up as different shades of gray on a grayscale printer and thus might be easier to interpret.

In the Data Points area, you can put labels and values in the vicinity of points on the graph. Sometimes these are helpful, but often they just clutter up the chart, without adding much additional information. In many cases, leaving both options unchecked is a good idea.

Select the Transparent Background check box of the Customize Settings area to underlay content beneath a chart and make the underlaid content visible. You can select from several marker sizes, marker shapes, and bar sizes (for a bar chart). The defaults are good choices to start with.

On charts, a *legend* is not a tale of heroic deeds handed down from long ago. It's an explanation of what the various elements of the chart represent.
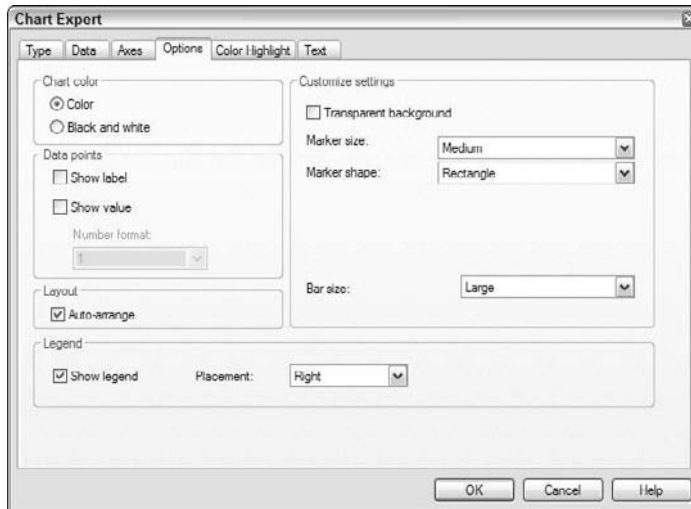
Figure 15-4:
The Options tab, Chart Expert.

Color Highlight tab

From the Color Highlight tab, you can give the individual elements of a chart the exact color that you want rather than merely accepting the default colors that are automatically assigned to each element. Figure 15-5 shows the Color Highlight tab.
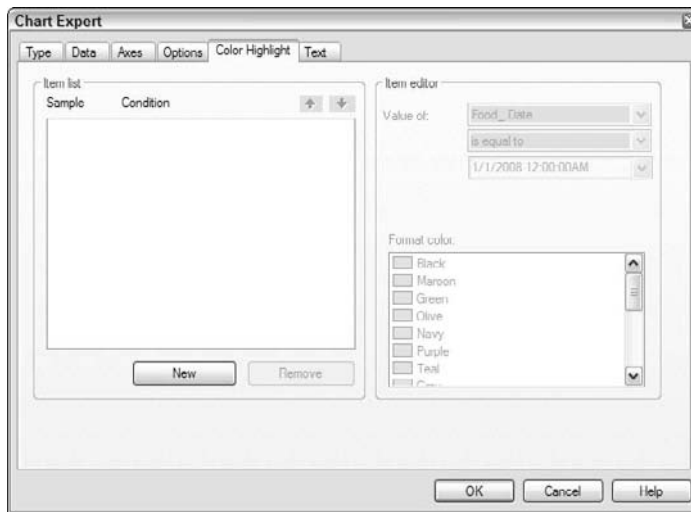
Text tab

The Text tab in Chart Expert, which is shown in Figure 15-6, is where you add some text to the chart. The two areas are Titles and Format. In the Titles area, the Auto-Text check boxes are selected by default. This means that Chart Expert selects a title for you, based on the fields that the chart uses. (Usually the default choice is not the best albeit somewhat descriptive.) The Format area at the bottom of the dialog box displays the default fonts chosen for the different types of text objects on the chart. You can select a different font for each of the Title, Subtitle, Footnote, and Legend Title categories by clicking the Font button. Doing so displays the Font dialog box, from which you can specify the font you want.

Creating a Chart

In this section, you run through the steps of using Chart Expert to create a chart. It's not difficult after you do it a few times, but in the beginning, there
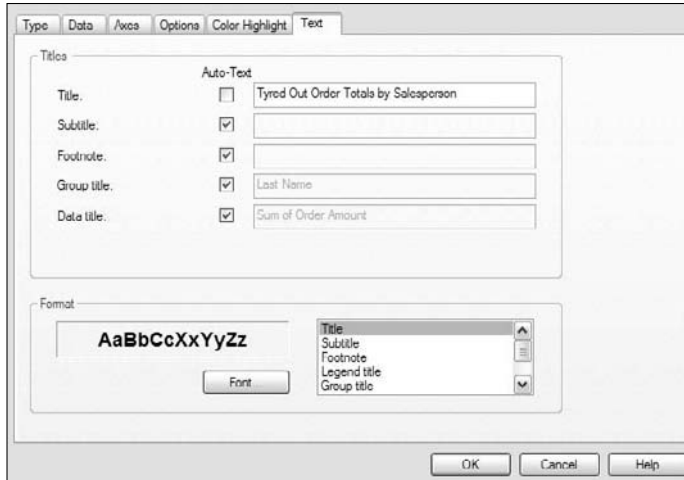
are behaviors that might have you scratching your head. Before you can create a chart, you must have a report, and the report must have data upon which to base the chart:

1. **Open a report and switch to Design mode.**

   For the example, use the Customer Orders, by State or District (Mexico) report from Chapter 8 as the basis for the chart. The chart shows the relative contributions of the various states or districts. Figure 15-7 shows what this report looks like.
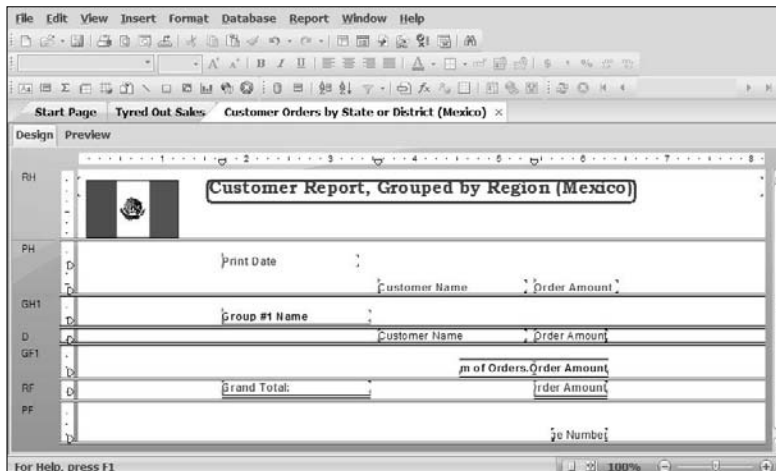
2. **Click the Insert Chart icon on the Insert Tools toolbar or choose Insert⇨Chart, and then drop the orange rectangle that appears into the Report Footer.**

3. **Right-click within the chart image that appears.**

   The Chart menu appears.

4. **Choose Chart Expert.**

   Chart Expert appears.

5. **Switch to the Type tab (refer to Figure 15-1); if necessary, make your selections.**

   To follow along with the example, from the Choose Your Chart Type selection pane, select Pie (probably the best way to show the fraction of sales orders coming from each state).

   The Vertical and Horizontal options at the bottom disappear because they don't apply to pie charts.

6. **Switch to the Data tab (refer to Figure 15-2) and make your selections.**

   To follow along with this example, make the following choices:

   a. *The only layout allowed is Advanced, so keep that.*

   b. *In the Data area, keep the default choices of On change Of: Customer.Region and Show: Sum of Orders.Order Amount.*

   Again, Crystal Reports has guessed correctly. You want the pie chart to start a new segment when Customer.Region changes. Customer.Region is the field that contains the state or district names. Also, the quantity you want to depict with the chart is the Sum of Orders.Order Amount field. Chart Expert didn't have to be too smart to select this field because it's the only numeric field in the report.

7. **Click the Options tab (refer to Figure 15-4) and make your selections.**

   To follow along with this example, make the following choices:

   a. *In the Chart Color area, select the Color radio button.*

   b. *In the Data Points area, select the Show Label check box.*

   c. *In the Customize Settings area, select Detach Pie Slice and then Largest Slice.*

   d. *In the Legend area, select the Show Legend check box, keep Right Placement, and leave Layout as Percentage.*

8. **Click the Text tab (refer to Figure 15-6) and make your selections.**

   To follow along with the example, make the following choices:

   a. *Clear the Title Auto-Text check box and replace the default title with* **Orders by State or District**.

  *b. Clear the Subtitle Auto-Text check box and type **for Mexico**.*

  c. In the Format area, accept the defaults or change them to fonts you like better.

9. **When you're finished, click OK to add the chart to your report.**

The bottom of the report page looks like Figure 15-8. The pie chart is displayed, the largest slice is pulled out, and the legend appears on the right. It is clear that Distrito Federal is by far the biggest contributor to sales.

Figure 15-8: Pie chart for the Customer Orders by State or District (Mexico) report.
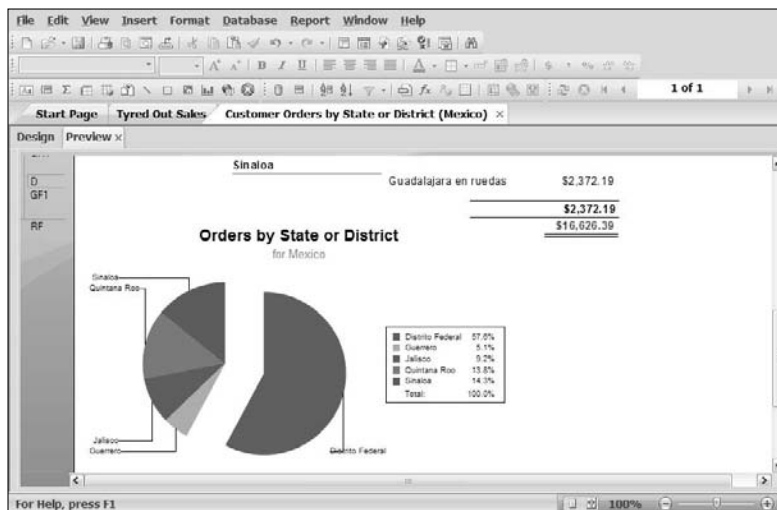
Drilling down from a chart

The steps in the preceding section create a chart based on a report in which the details were hidden. Because the details are hidden — and not suppressed — you can drill down to see them if you hover the cursor over the subtotal fields in each Group Footer. When the cursor changes from the arrow shape to the magnifying-glass shape, a double-click drills down to the detail of the group.

You can do the same thing with the chart. When you hover over one of the pie slices in the chart, the cursor changes to the magnifying glass drill-down cursor, and you can double-click. You see the same detail that you'd see if you drilled down from the associated Group Footer. At the same time, a new tab appears to the right of the Preview tab, corresponding to the group you drilled into. From now on, when you want to view the detailed information for that group, you need only click its tab.

Changing a chart

After you create a chart on a report and viewed it, you might want to change it. Perhaps the audience for the report has changed, and a new chart type would be more appropriate. Perhaps some changes would improve the chart. Here's how:

1. **Right-click somewhere in the chart and choose Chart Expert.**

   Chart Expert appears, with all the options and other selections that you have made.

2. **Make your changes:**

   • *To change the type of chart:* Use options on the Type tab.

   • *To change the layout:* Use options on the Data tab.

   You can change any of the parameters that you originally set when you created the chart.

3. **Click OK.**

   Your changes are instantly incorporated into the chart.

Choosing the Best Chart Type for Your Data

The charting capabilities of Crystal Reports give numbers and statistics an added dimension of communication. Numerical data represented visually in a chart can much more readily reveal trends or show relative sizes. Different types of data are best displayed with different types of charts, and Crystal Reports offers a wide variety to accommodate just about any data set you may have. This section provides a brief summary of each chart type.

Side-by-side bar chart

A *side-by-side bar chart* represents data as a series of bars, lined up side by side and extending vertically from the bottom or horizontally from the left edge of the chart. This type of chart is an excellent choice for displaying comparative values, such as the annual sales volume for a company's major divisions for a period of several years. Not only sales totals, but also any trends, in sales would be evident.

Figure 15-9 shows a 2-D, side-by-side bar chart (top). Another option is the side-by-side chart using depth effect, also shown in Figure 15-9 (bottom).
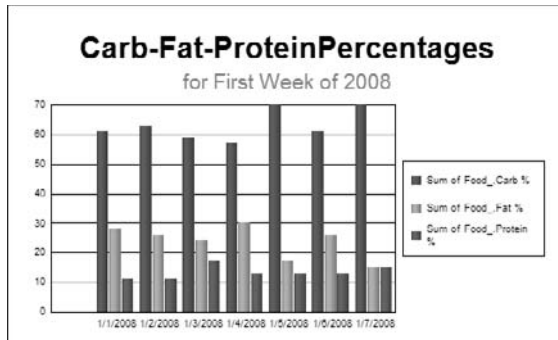
Figure 15-9:
2-D, side-
by-side bar
chart (top)
and 3-D
side-by-side
bar chart
(bottom).
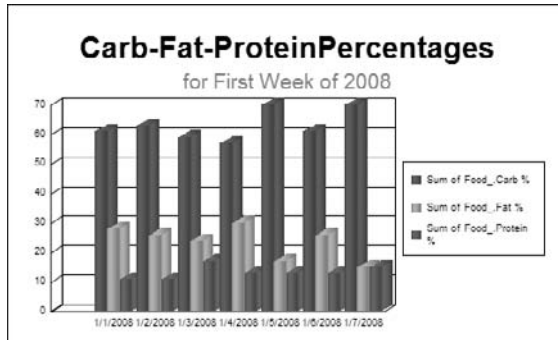
Percent bar chart

A *percent bar chart* also represents multiple series of data as vertical or horizontal bars, but a single bar represents each value for all series. The value of the second series is stacked on top of the value of the first series, the value of the third series stacked on top of the second series' value, and so on. Using a percent bar chart is good to show how the relative contributions of the elements of each series change over time. Figure 15-10 shows a 2-D percent bar chart. 3-D percent bar charts are also available.

Line chart

A *line chart* displays one or more lines that each connects a series of points. This type of chart is excellent for showing the value of a single variable as it

changes over time or the values of several variables with comparable scales. Figure 15-11 shows a line chart of calories consumed daily for the week starting January 1, 2008.

Figure 15-10: A 2-D percent bar chart.
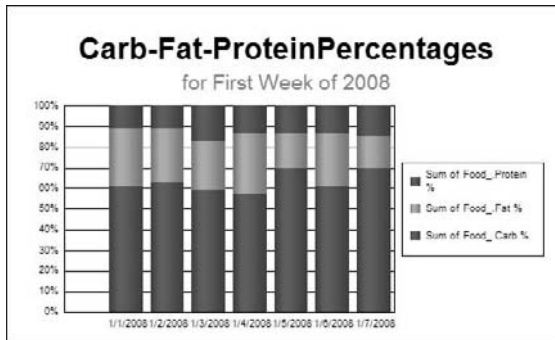
Figure 15-11: A line chart.
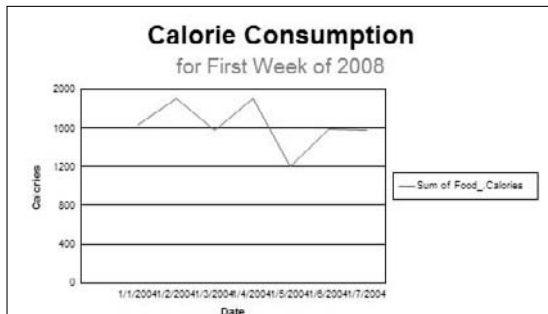
Area chart

In an *area chart,* areas that are filled in with colors or patterns represent the values of variables. This type of chart is good for showing the percentage contribution of a small number of variables to a total. Figure 15-12 shows an area chart displaying the same information as the bar charts earlier in this chapter.
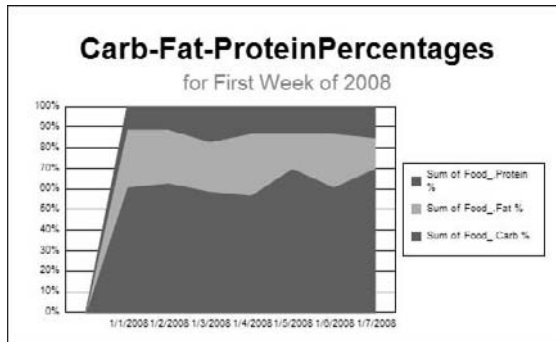
Pie chart

Pie charts are 2-D circular charts that display one series of data values, where each value determines how large a sector of the pie that element of the series receives. You might use a pie chart to show the relative contribution each operating division makes to a corporation's sales. Or you might use it to look at food consumption. Figure 15-13, which is a pie chart that looks at only the fat data for the first week of 2008, shows that fat consumption varied quite a bit.
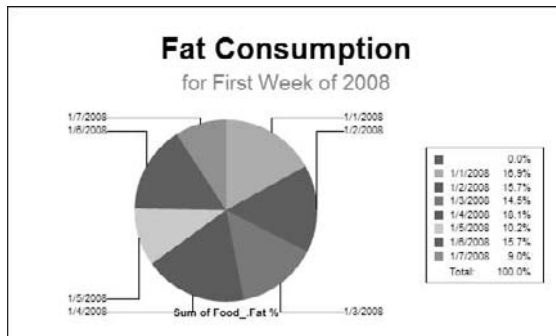
Doughnut chart

A *doughnut chart* is similar to a pie chart, but the center of the pie is cut out. In Crystal Reports, the hole is either a 2-D or 3-D ring that encircles a number, which might or might not bear any relationship to what you're trying to emphasize with your chart. The number is supposed to show how many records are being represented; however, depending on your data, that number might not relate to anything pertinent. Figure 15-14 shows a

doughnut chart for the same data illustrated by the pie chart in Figure 15-13. The doughnut's colored sections are equivalent to the pieces of the pie. In this case, the number in the center of the doughnut is unrelated to the percentage of fat in a person's meals.

REMEMBER

Pie charts and doughnut charts are used for pretty much the same things. Which one you choose to use is largely a matter of personal preference.

Fat Consumption
for First Week of 2008

		0.0%
■	1/1/2008	16.9%
■	1/2/2008	16.7%
■	1/3/2008	14.6%
■	1/4/2008	19.1%
■	1/5/2008	10.2%
■	1/6/2008	15.7%
■	1/7/2008	9.0%
	Total:	100.0%

$166

Figure 15-14:
A doughnut chart.
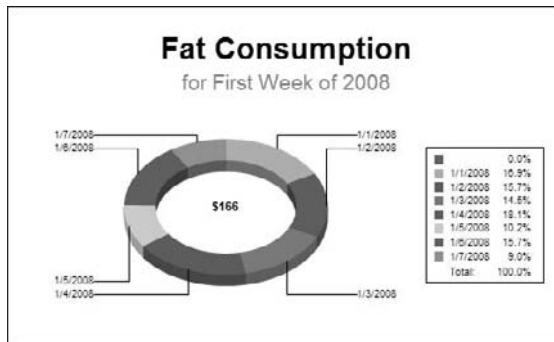
3-D riser chart

A *3-D riser chart* is a cool way to represent several series of data points. If the number of series and the number of data points are both under about ten, a 3-D riser chart can convey a lot of meaning — and look great, too. Values are represented by 3-D pillars rising from a plane. Various shapes of objects are available.

Figure 15-15 shows a 3-D riser chart. It uses octagon-shaped risers, which I think are the best looking of the several available riser shapes. For some data sets, however, one of the other shapes may be better. Try them all out to see which one communicates your data best.

Carb-Fat-ProteinPercentages
for First Week of 2008

Figure 15-15:
A 3-D riser chart.
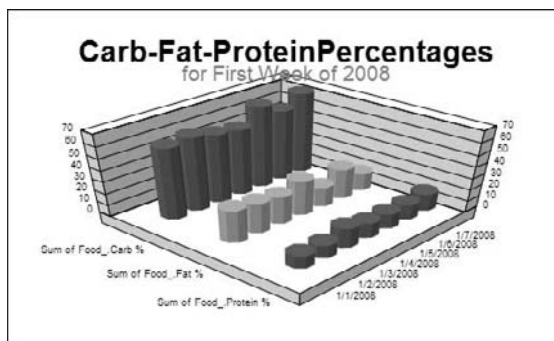
3-D surface chart

A *3-D surface chart* represents several series of data points with a multicolor surface that sits over a plane. Several variants of the 3-D surface chart are available. With a 3-D riser chart (see the preceding section), a 3-D surface chart is most meaningful with fewer than ten series and ten data points within each series.

Figure 15-16 is an example of a honeycomb, 3-D surface chart. It gives the data a different look from that obtained with the 3-D riser chart.
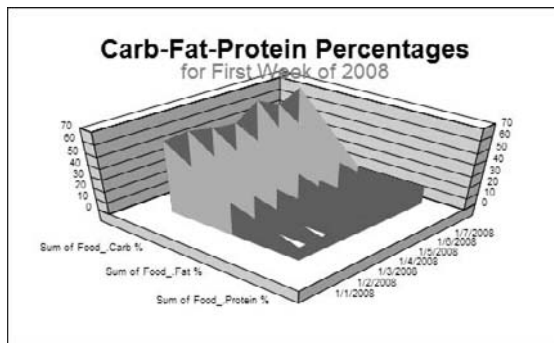
XY scatter chart

XY scatter charts are effective when you have a large number of data points and you want to see (for example) whether any clusters show up in the data — and, if so, how compact the clusters are. These graphs are also good at showing whether two variables are correlated. If they are, you'll be able to draw a line with a characteristic slope through the average location of the points. The slope indicates the nature of the relationship. The closeness of the points to the line indicates the strength of the relationship.

This chart in Figure 15-17 plots carbohydrate consumption on the horizontal axis against fat consumption on the vertical axis. The two are definitely correlated because they fall close to a straight line. The variation from a perfect linear relationship is caused by varying protein consumption (not shown) from day to day. The legend to the right of the chart is not legible. The XY scatter chart was apparently not designed for this many data points.
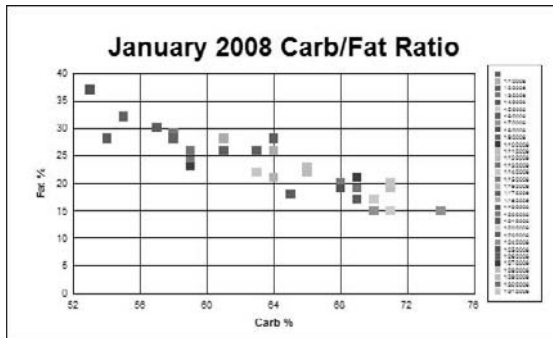
Radar chart

A *radar chart* is a polar graph that looks somewhat like a radar screen or a plot of an antenna's radiation characteristics. Arrayed around the perimeter are the changing values that generate the chart. The magnitudes of the one or more series of data depicted by the chart are shown by how far they extend from the center toward the perimeter. This type of chart is good for showing how several quantities vary with respect to each other as time or some other variable changes.

The chart in Figure 15-18 shows the same data as the XY scatter chart, but in a very different form. In this chart, the outer jagged line shows the amount of carbohydrate consumed on a daily basis, and the inner jagged line shows the amount of fat.
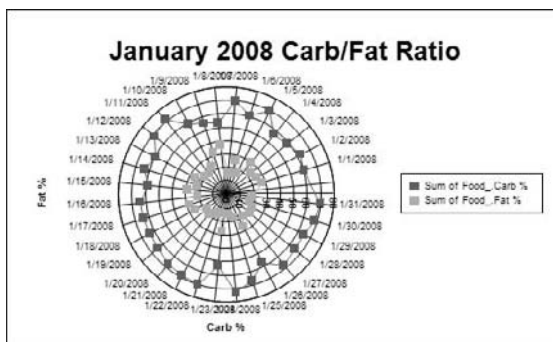
Bubble chart

A *bubble chart* is similar to an XY scatter chart, which illustrates the relationship between two data series. In a bubble chart, though, the markers that

indicate data points are circles that vary in size, depending on the value of a third data series. The larger the value of a point in that third data series, the bigger the circle. The value of one variable is plotted against the X axis; the value of a second variable is plotted against the Y axis; and the value of a third variable is indicated by the size of the bubble. Use this type of chart when you have three series of data that vary with time or with some other fourth variable.

The bubble chart in Figure 15-19, like the XY scatter chart, shows a definite linear relationship between carbohydrate and fat. In addition, the bubble chart explicitly shows the magnitude of the protein variable. Once again, the legend to the right of the chart is unreadable. Bubble charts have many of the characteristics of XY scatter charts.

Figure 15-19: A bubble chart.
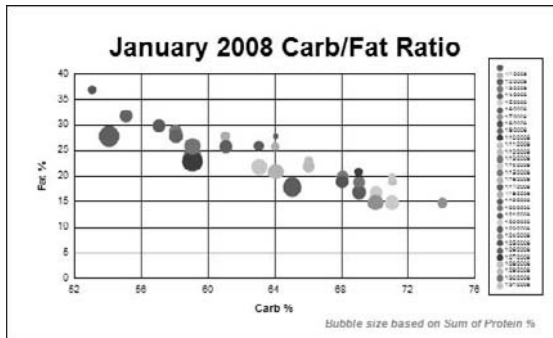
Stock chart

A *stock chart* is familiar to anyone who reads the financial section of a news-paper. It's used to show the daily price ranges of stocks and of indexes, such as the Dow Jones Industrial Average. For a given date, a line indicates the range of the variable, extending from the variable's lowest to highest values for that day. Crystal Reports gives you a similar chart; you can create it with or without the little tick marks that identify the opening and closing prices. To include the opening and closing tick marks, you need to have four columns of data: Open, High, Low, and Close.

This type of chart is good for showing the differences between two variables.

Figure 15-20 shows a stock chart.

Figure 15-20:
A stock chart.
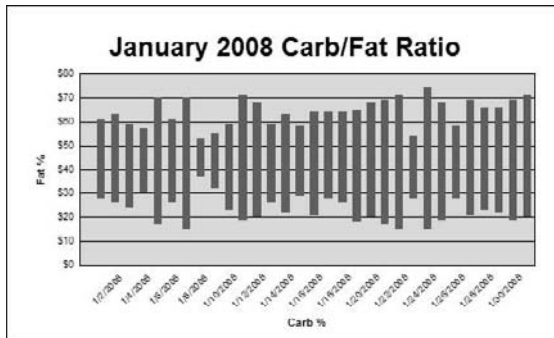
Numeric axis chart

Numeric axis charts come in six types, as shown in Figure 15-21. They are the numeric axis bar, line, and area charts; and the date axis bar, line, and area charts.

These charts are similar to the ordinary bar, line, and area charts except that their X axis must be a numeric or date type. The ordinary, bar, line, and area charts are more flexible, but the numeric axis charts may be somewhat simpler to create, assuming that you want the horizontal axis to represent either numbers or dates.

Figure 15-22 is a numerical axis chart, showing one month of data on the composition of a person's food intake.

Figure 15-21:
Chart Expert, showing the six numeric axis chart types.
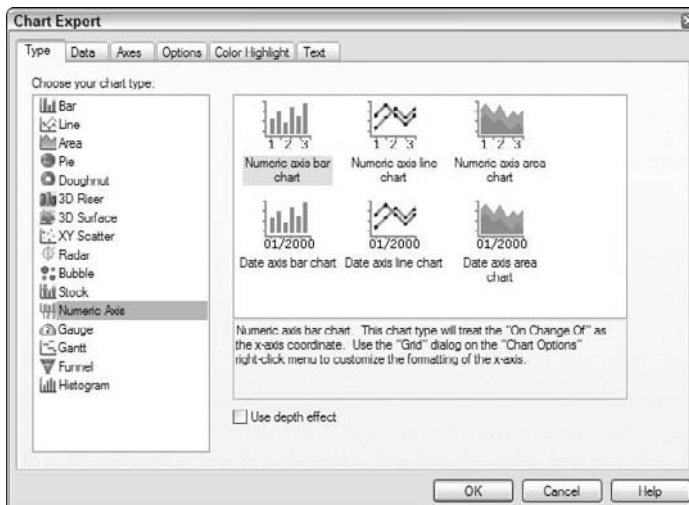
Figure 15-22:
Numerical axis chart showing diet composition for a one-month period.
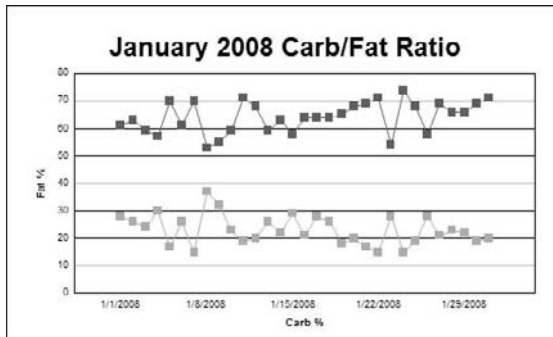
Gauge chart

A *gauge chart* displays a graphic that looks like an automobile speedometer gauge, with a rotating hand indicating the value of the reported quantity. This type of chart is appropriate only when you have a small number of values to display. If you have too many, the gauges get stacked one atop the other in a jumbled mess.

Figure 15-23 shows a gauge chart of a person's food intake for January 19, 2008.

Figure 15-23:
Gauge chart showing protein, carb, and fat intake.
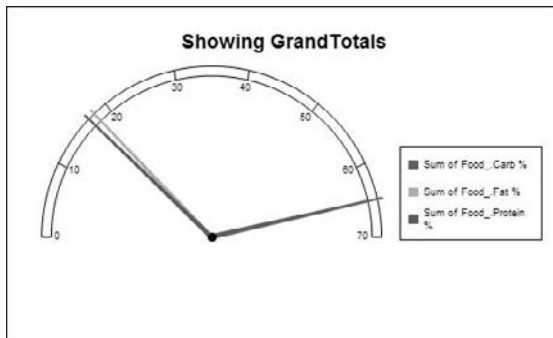
Gantt chart

Project managers often use *Gantt charts* to track progress. Figure 15-24, for example, shows five weeks of data on how quickly Xtreme Mountain Bikes,

Inc. ships its products. Each bar represents the interval of time between the entry of an order and when that order was shipped. As you can see, some orders are shipped promptly while others are not. Management can examine which orders were shipped after an excessive delay, and possibly make changes to enable the faster shipment of such orders.

Figure 15-24: Gantt chart showing order turnaround for a five-week period.

Funnel chart

A funnel chart, usually used in customer relationship management (CRM) applications, shows how one series of data points varies over a period of time. Figure 15-25 shows a week of carbohydrate consumption. This type of chart is not particularly applicable to nutrition data, but this example does show what a funnel chart looks like.

Figure 15-25: A funnel chart of carbo-hydrate con-sumption.
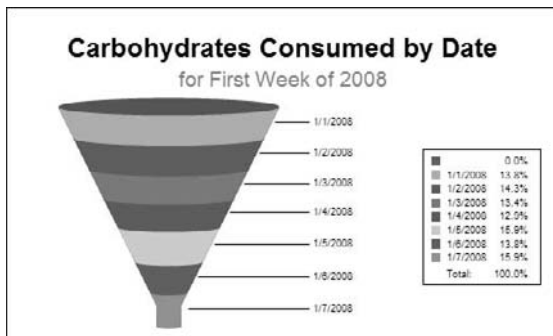
Histogram

A *histogram* divides data up into intervals called "buckets" and displays the relative amounts of whatever is being measured that falls within each interval. Figure 15-26 shows a histogram that displays how much fat a dieter consumed during the first week of 2008. Histograms differ from bar charts in that each bar in a histogram represents a range of values, while each bar in a bar chart represents a single discrete value.

Figure 15-26:
A histogram of fat consumption.
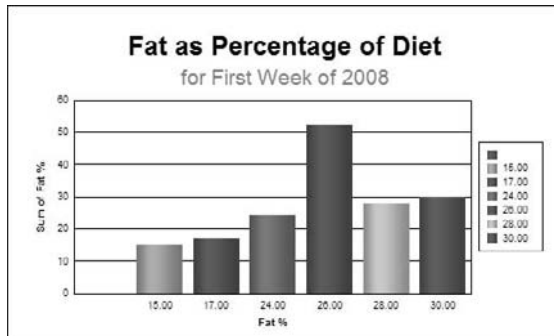
Different Chart Layouts for Different Data Types

Crystal Reports deals with data sets of four different types. The most basic is data retrieved from the database and sent more or less directly to the Details section of the report. No grouping or summarizing is involved. The Advanced chart layout deals with this kind of data; using it, you can filter the data with one or two conditions. You can also group values in several different orders, plot a value for each data record, plot a grand total for all records, and base charts on formulas or running-total fields.

The Group layout provides a higher-level overview than an Advanced layout can. It displays summary information when the value of a specified field changes. Logically enough, you can use the Group layout with only those reports that have at least one group — and at least one summary field for that group.

Figure 15-27 shows a cross-tab report of glove inventory for Xtreme Mountain Bikes, Inc.

The OLAP layout is the structure of a chart based on an OLAP cube. Figure 15-28 shows an example of a chart derived from an OLAP cube. (You can read

about using OLAP and OLAP cubes in Chapter 13.) It shows how Xtreme's helmets are selling in California. Clearly, Bike Shop from Mars is selling more Triumph Pro helmets than the other dealers. The Triumph Vertigo helmet is selling well at Off the Mountain Biking and Sporting Wheels, Inc.

Figure 15-27: The upper-left corner of an Xtreme cross-tab report.
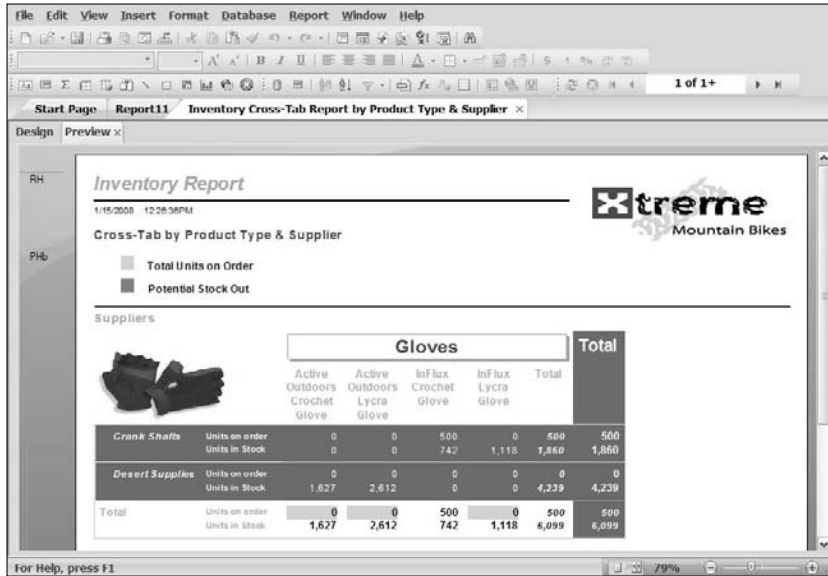
Figure 15-28: An OLAP, 3-D riser chart breaking down California sales by Customer and Product.
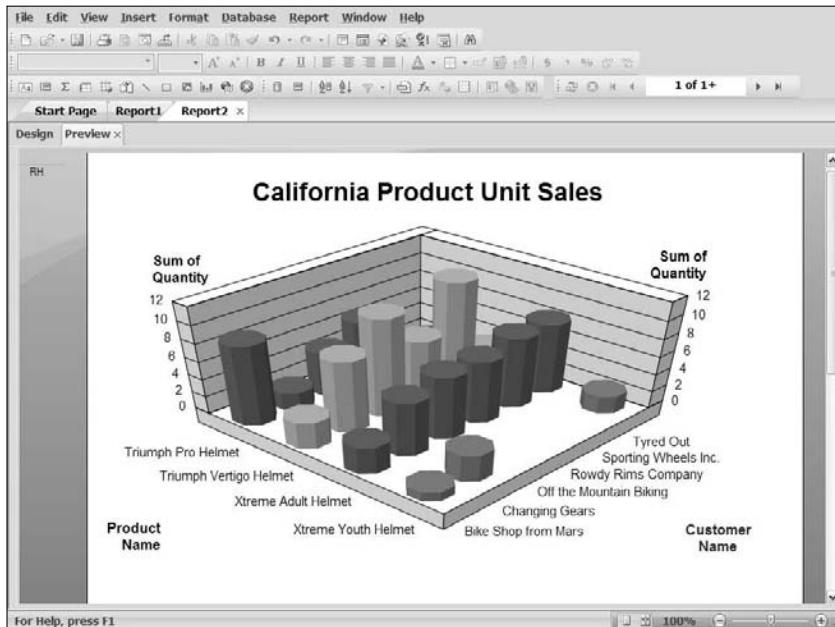
Seeing How Chart Placement Affects the Data It Represents

As you can read earlier in this book, a report has multiple sections: a Report Header; a Page Header; zero or more Group Header sections; Details sections; and Report, Page, and Group Footer sections. Charts can appear in the Report Header and Footer or in a Group Header and Footer.

A chart in the Report Header or Report Footer section draws its data from the entire report. A chart in a Group Header section draws its data from only that group.

With a chart in the Report Header or Report Footer, you can graphically convey the main point of the report. With charts in either a Group Header or a Group Footer, you can show a chart that displays the important information specific to each group.

Figure 15-29 shows a Report Header chart located above data for one of Xtreme Mountain Bikes, Inc.'s customers in California. It shows the values of the sales that Xtreme's various salespeople have made to this customer.
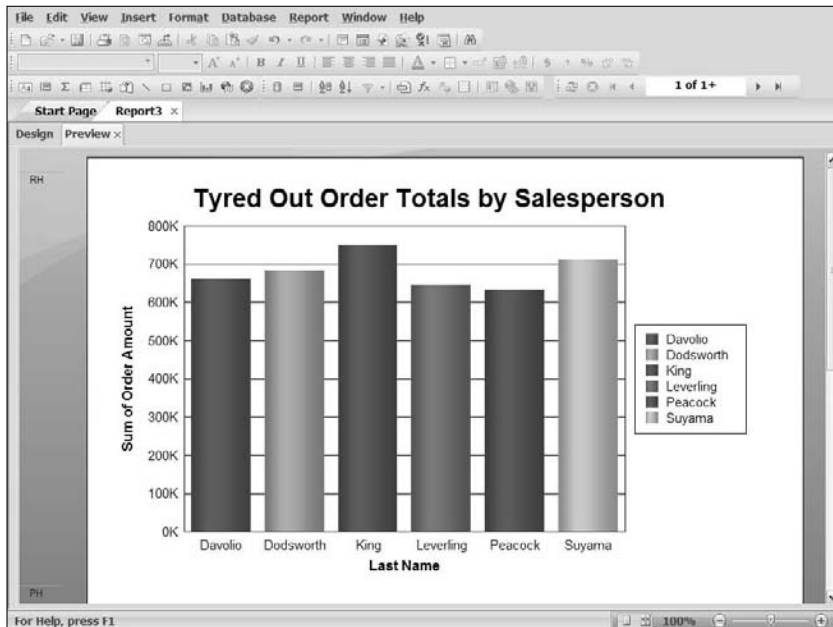
Figure 15-29: A chart in the Group Header section.

Troubleshooting Chart Problems

Sometimes the chart you're creating for a report just doesn't turn out the way you expect. This is less likely to happen as you gain experience with Crystal Reports, but in the beginning, it might occur frequently. Some problems result from a beginner's unfamiliarity with the powerful Crystal Reports features. It's also possible to envision a report that simply isn't possible to create, regardless of the power of your report writer. Other problems occur if you try to squeeze too much information into too small of a space.

Selecting data to make a chart readable and meaningful

Earlier in this chapter, I show you how to create a chart that displays cumulative sales orders for all the states and districts in Mexico where Xtreme Mountain Bikes, Inc. has customers. Suppose you want to create a similar chart for the United States. The report would be essentially the same, but with a different selection condition. That is, Customer.Country is equal to USA instead of Mexico. However, if you build the same report in the same way, but this time for the USA rather than Mexico, you might get something like Figure 15-30. I changed the selection condition to USA, but did not yet change the subtitle from Mexico.
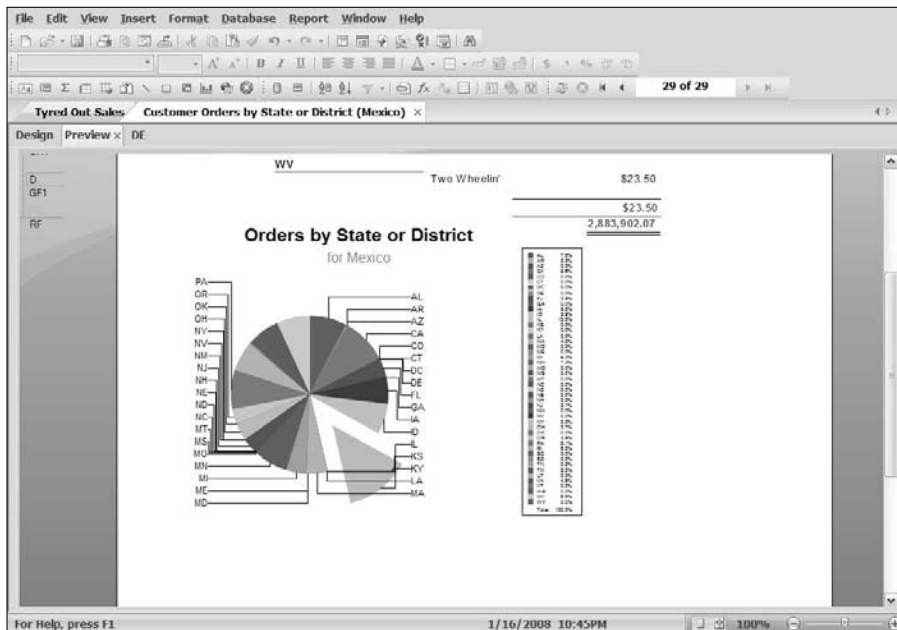
Figure 15-30:
The chart is getting busier.

If you had sales in all 50 states plus the District of Columbia, you'd have too many states to make a good pie chart. The result would not communicate very well (tiny slices, hard to see, that sort of thing). However, if you display only the states with the ten largest sales volumes, you get a reasonable chart.

The placement of chart elements matters

When you created the chart for Mexico, I had you keep the default legend placement (on the right side of the page). If you select a bottom placement, however, your chart looks quite different, as shown in Figure 15-31.

The legend at the bottom is so tall that it covers the entire chart. If you ever encounter bizarre behavior such as this, check whether one element of the chart is hogging the area that rightfully belongs to another element. If it is, you can usually find a way to rearrange things so that everything is displayed.
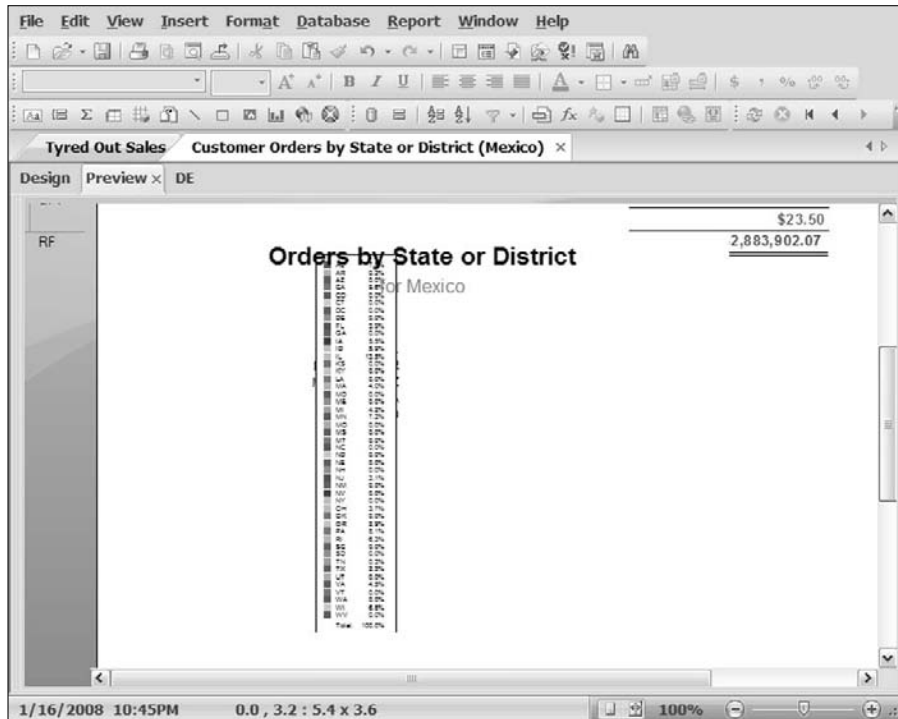
Figure 15-31:
Customer Order chart for USA with moved legend.

Chapter 16

Adding Geographic
Detail with Maps

In This Chapter

▶ Discovering different map layouts and map types

▶ Creating group, cross-tab, and OLAP layout maps

▶ Troubleshooting maps problems

*M*any reports contain geographic information, which is easier to comprehend when you add maps that show how the information relates to relevant geographic locations. For example, the Xtreme database (the sample database used throughout this book) contains information on customers located in various cities, regions, and countries around the world. A sales manager might want to know which localities have a concentration or lack of customers, or a high or low sales volume.

All the reasons why charts are a valuable addition to a report apply to maps as well. For data that has a geographical connection, maps are even more valuable. If you can identify a fact (such as a sales total) with a particular city, state, or country, you lock that fact into the reader's mind much more securely than you would if you displayed only a table of numbers.

Crystal Reports has a built-in feature for adding maps to reports, with several different layouts and map types. The various choices enable you to create a map that does the best job of communicating important parts of your report.

Choosing the Right Crystal Reports Map

Before you can create a map with Crystal Reports, you must have a data source with one or more geographical fields (such as City, Region, or Country). Depending on the specific data you have (and on how you want to display it geographically), you can choose the kind of map most likely to have the biggest effect on readers. You can choose both the map layout and the type of map.

Map layouts

Four map layouts are available: Group, Cross-Tab, OLAP, and Advanced. Each layout is designed for a specific kind of report, as follows:

- ✔ **Group layout** is usually best when your report has groups, and you want to associate a map with each group. Chapter 6 covers how to create groups in your report.

- ✔ **Cross-Tab layout** is designed to be a part of a cross-tab report. I cover cross-tab reports in Chapter 14.

- ✔ **OLAP layout** is designed for use with a report containing an OLAP grid. Chapter 13 discusses OLAP reports.

- ✔ **Advanced layout** is for any map that doesn't fall into the other three categories. It works well for reports that don't have groups or summaries, as well as reports that do.

Map types

In addition to the four map layouts, you can choose one of five map types. If the data you're reporting has a geographic component, one of these map types is probably the best way to show the geographical relationships of the data. The major value of Crystal Reports maps is that they associate some numerical quantity (such as a sales total) with a geographic location in a memorable visual impression that is more likely to be retained.

Ranged type

For numerical quantities that can take on an almost infinite variety of values (such as sales totals), it's helpful to aggregate records with similar values into *bins* — digital storage areas for related records. Each one holds the records for a range of values: a subset of the total range of values. By assigning each bin a different color, shade of gray, or other indicator of magnitude, you can associate geographical regions on a ranged map with specific quantities, making comparisons easy. You can establish bin size in four ways:

- ✔ **Equal count:** With an equal count ranged map, the same number of regions (or as close to the same number as possible) appears in each bin. For example, if the regions are the 50 states of the United States and 10 different bins show ranges of sales volume, each of 10 different shades of gray can be applied to 5 states. The five states with the highest level of sales would perhaps be shown as white, and the five states with the lowest level of sales would be shown as black, with progressively darker shades of gray in between, moving from high sales volume to low.

This map type is best to use when values are unevenly distributed among the regions. It prevents a situation in which most regions are the same color, with only one or a few that fall into different bins and thus have different colors.

✔ **Equal range:** This map type has bins of equal size (or as close to equal as possible), regardless of how many records fall into each bin. Equal range maps are most useful when the distribution of values being displayed is fairly uniform, with approximately equal numbers of records in each bin.

✔ **Natural break:** This map type applies only to reports that contain summary values. It assigns separate clusters in the data into separate bins.

✔ **Standard deviation:** This map type is used to show statistical analysis. It is best used with three bins: no more, no fewer. The middle bin shows regions associated with values within *one standard deviation of the mean* of the entire data set. The bins above and below hold the regions that are more than one standard deviation removed from the mean.

Dot density type

The *dot density* type of map is a good tool to use for giving the reader a general idea of where concentrations of records are located and the overall distribution of records. One dot is placed on the map for each record. A company might use this type of map to show the locations of their dealerships. The map would make obvious which regions are adequately covered and which are not — but wouldn't be good at conveying quantitative information.

Graduated type

The *graduated* type of map is similar to the ranged type, putting a symbol in the middle of each region (instead of giving an entire region a specific color or shade of gray) to represent the numerical value associated with that region. The size of the symbol corresponds to the magnitude of the associated value. The default symbol is a circle, but you can use a different symbol if you want.

Pie chart type

The *pie chart* type of map associates a pie chart with each geographic area being displayed. It's useful only when you're comparing the values of several related items in a geographic region. For example, if you want to know the relative sales levels of Xtreme's five major product categories in each region, a pie chart associated with each region on the map would give you a visual picture of that comparison.

Pie charts make sense only if the values of all segments of the pie add up to 100 percent of the total.

Bar chart type

As with pie charts, *bar charts* associated with maps are useful only when you're comparing the values of several related items in a geographical region. Unlike pie charts, bar charts don't require that the total of all values represented by the bars add up to 100 percent. You can use bar charts to show, for instance, the relative sales of bicycles and helmets for the regions of interest, ignoring the other products that Xtreme sells.

Map placement

Where you place a map on a report depends on the information you want it to display. If the map uses data taken from the entire report, you want to place it in the Report Header or Report Footer section so it can access the needed data. If you want to associate a map with a specific group in the report, place the map in the Group Header or Group Footer for that group. You can also place a map in a subreport of your main report. (See Chapter 11 for information on subreports.)

Creating a Map Step by Step

To create a map, start with a report that has the kind of data best illustrated by a map. This means the report should have at least one geographical field, such as city, state, or country. It also should have at least one numerical field, the value of which varies from one geographical location to another. Certain kinds of maps, such as the pie chart and bar chart types, have additional constraints, as noted previously.

Creating an advanced layout map

This section uses the Advanced layout to add a map to a report:

1. **Load the Customer Orders, by State or District (Mexico) report.**

   See how to create this report in Chapter 8.

2. **On the Insert Tools toolbar, click the Insert Map icon.**

   The Data tab of Map Expert appears.

3. **In the Placement area, select Once Per Report for the Place Map pull-down list, and then select the Footer option.**

   This places the map in the Report Footer.

4. In the Layout area, click the Advanced icon.

The display of the Data area changes, as shown in Figure 16-1.
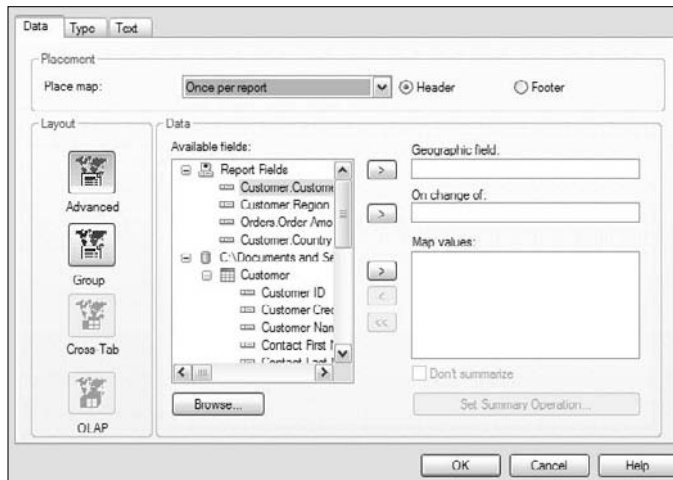
5. Drag Customer.Region from the Available Fields pane to the Geographic Field text box.

The Customer.Region field automatically appears in the On Change Of text box, also.

6. Drag Report Area:Sum of Orders.Order Amount from the Available Fields pane to the Map Values pane.

7. Click the Type tab.

The default type shows as Ranged, which is what you want, so keep it. The other defaults are good, too, so leave these setting as they are:

- *Number of Intervals:* 5

- *Distribution Method:* Equal count

- *Color of Highest Interval:* White

- *Color of Lowest Interval:* Black

8. Verify that the Allow Empty Intervals option is checked.

9. Click the Text tab.

10. Type a map title and legend titles, if appropriate, and then click OK.

Map Expert generates your map, as shown in Figure 16-2.
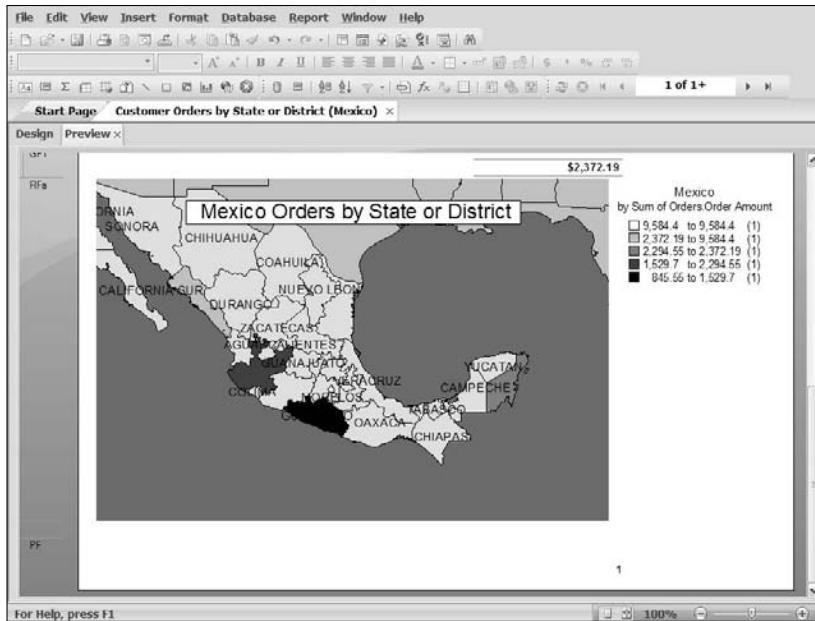
Figure 16-2:
The map
appears in
the Report
Footer.

The five states or districts appear in five shades of gray as you specified. The top-producing Distrito Federal is white — and a little difficult to see because it encompasses only Mexico City. The state of Guerrero is black because it has the lowest order total. The three other states that have Xtreme customers have three different shades of gray.

You can make various alternate choices — different types, different fields, different options — but the procedure for any of the Advanced layout reports is essentially the same. The procedure for the other layouts is a little different.

Creating a Group layout map

To create a map with a Group layout, your report must have at least one group and at least one summary field for that group. To illustrate this, you can use the Customer Orders, Grouped by State or District (USA) report created for the United States in Chapter 6. The Mexico report doesn't have enough states to show grouping.

To create a Group layout map, do the following:

1. **Click the Insert Map icon.**

2. **Make sure that the Data tab of Map Expert is displayed.**

3. **In the Placement area, specify a placement of Once Per Report, in the footer.**

4. **Confirm that in the Layout area, Group is selected.**

5. **In the Data area, retain the Customer.Region option in the On Change Of pull-down list, and the Show: Percentage of Sum of Orders.Order Amount option.**

6. **Switch to the Type tab and verify that Ranged is selected, the Number of Intervals is 5, and the Distribution Method is Equal Count.**

   Also, leave Color of Highest Interval as White, and Color of Lowest Interval as Black. Leave the Allow Empty Intervals check box marked.

7. **Click OK.**

   The map shown in Figure 16-3 appears in the Report Footer. As the map shows, several states (including Pennsylvania, California, and Idaho) are doing substantial business. However, Maine, Mississippi, and Georgia (among others) are doing relatively little.
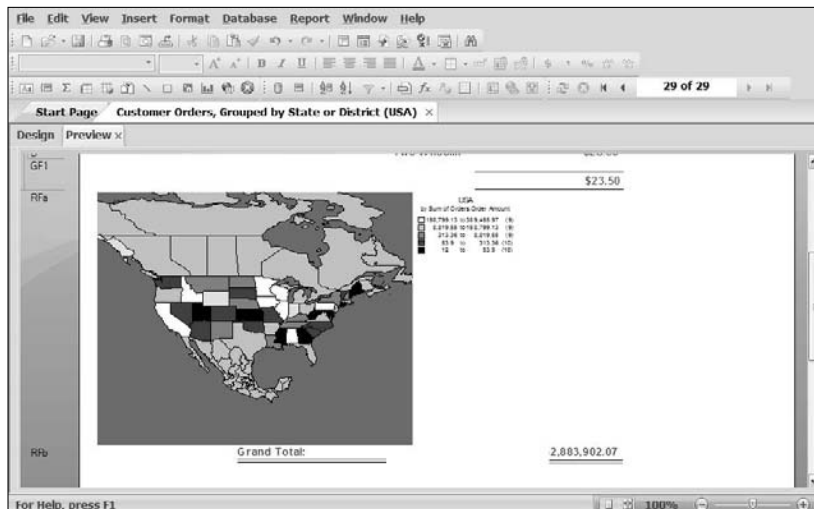
Figure 16-3: A map showing distribution of orders from the United States.

Creating a Cross-Tab layout map

To create a Cross-Tab layout, your report must have a cross-tab summary field, and the rows or the columns must contain a geographical field. In Chapter 14, I show you how to build a report that shows Xtreme's sales from several provinces of Canada (Sales by Province). You can use that report as the base for a Cross-Tab layout map.

To create a map showing the relative sales figures for Canadian provinces that contain Xtreme customers, do the following:

1. **Click the Insert Map icon, or choose Insert⇨Map.**

   The Data tab of Map Expert appears.

2. **In the Placement area, select the Footer radio button.**

3. **Click the Cross-Tab icon to change the Data area to the Cross-Tab function.**

4. **In the Data area, for the Geographic Field, select Customer.Region.**

5. **Verify that Map Values pane contains Sum of Orders.Order Amount.**

6. **Click the Type tab, and verify that the Ranged type is selected.**

7. **Adjust the options the way you want them, and then click OK.**

   I chose white to be the color of the highest interval and black to be the color of the lowest, with five intervals, because Xtreme has dealers on only five provinces. Crystal Reports draws your map, which should look something like Figure 16-4. British Columbia is white, indicating it has the highest order volume. Manitoba is black because it had the smallest order totals. The other regions are in shades of gray.
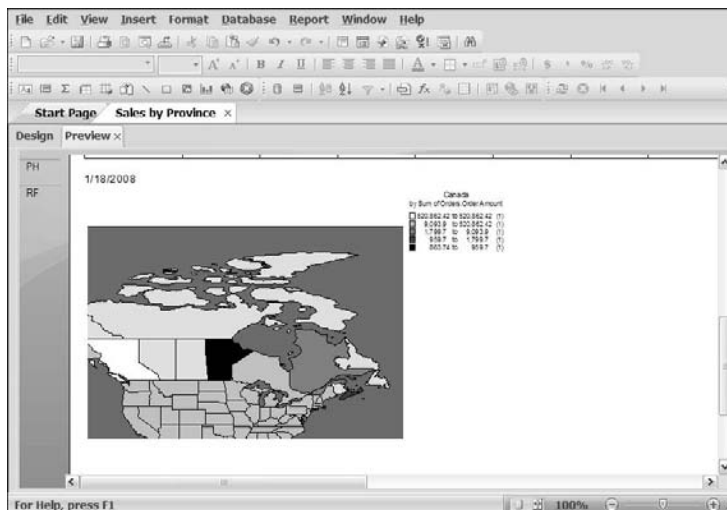
Figure 16-4: A map showing order volume in Canada.

Creating an OLAP layout map

The procedure for creating a map with an OLAP layout is similar to the procedure with a Cross-Tab layout. The main difference is that the report must contain an OLAP grid rather than a cross-tab object. One of the dimensions of

the grid must be a geographical field. Chapter 13 describes creating a report with an OLAP grid. However, it doesn't have a geographical dimension, so a map with an OLAP layout would make no sense in that report.

To add a map to OLAP grid that *does* have a geographical dimension, follow these steps:

1. **With any report that has an OLAP grid with a geographical dimension, click the Insert Map icon (on the Insert Tools toolbar).**

   Map Expert appears.

2. **In the Placement area, select either Header or Footer.**

3. **In the Layout area, click the OLAP icon if it's not already selected.**

4. **In the Data area, select a geographical field in the On Change Of pull-down list.**

5. **If you're adding a pie chart or bar chart to the map, select a field in the Subdivided By pull-down list. For a ranged map, leave this option at None.**

6. **For a simple map, leave the Other Dimensions option alone.**

7. **Click OK.**

   Crystal Reports draws the map you specified, basing it on the information in the OLAP grid.

Including maps in subreports

You can include maps in subreports. The procedure for including a map in a subreport is the same as that for a report except that the subreport Design tab must be active.

Changing maps

After you add a map to a report, it's not cast in concrete. You can change it easily. Just right-click the map and choose Map Expert. Now you have the same control over the map as you had when you first created it.

Troubleshooting Map Problems

If you create a map and it doesn't look the way you expect it to, make sure that the Preview tab is active. If the Design tab is active, Crystal Reports displays a generic placeholder map in the location where the actual map is located.

If you create a map and all you see is a blank rectangle, make sure you based the map on a geographical field. If you based it on a non-geographical field, Crystal Reports displays a non-geographical map — in effect, nothing.

If you create a map of the Ranged type and you don't get the spectrum of colors or shades of gray that you expected, check to make sure that the distribution method you chose is appropriate for the data you're illustrating.

Chapter 17

Interactivity Features

Crystal Reports 2008 makes a major leap forward in interactivity. To an extent never before possible, users can interact with Crystal Reports, using new dynamic capabilities. These new capabilities aren't provided by Crystal Reports alone, but rather are the result of Crystal Reports collaborating with other software programs. One of these programs, Crystal Xcelsius, is a Business Objects product, but others come from Adobe and Microsoft.

Crystal Xcelsius Overview

Crystal Xcelsius is a data-visualization design tool that serves as a decision support tool, providing users with a visually rich presentation, enabling them to interact with and more easily analyze their data. The result can be better business decisions, arrived at more quickly. Figure 17-1 shows an example of a Crystal Xcelsius visualization, which is also sometimes called a dashboard presentation.

What you see in Figure 17-1 is only part of the story because it's but a snapshot of a dynamic visualization. When you move the sliders at the lower left of the display, the bars on the bar chart change in length, the pie segments in the pie chart change in relative size, and the needle on the gauge changes position, as does the number displayed within the gauge. With these controls, a person can easily create What-If scenarios. Say, the growth rate of laptops were to double. By moving the Laptops slider, you can see what the overall result on product mix and revenue would be.
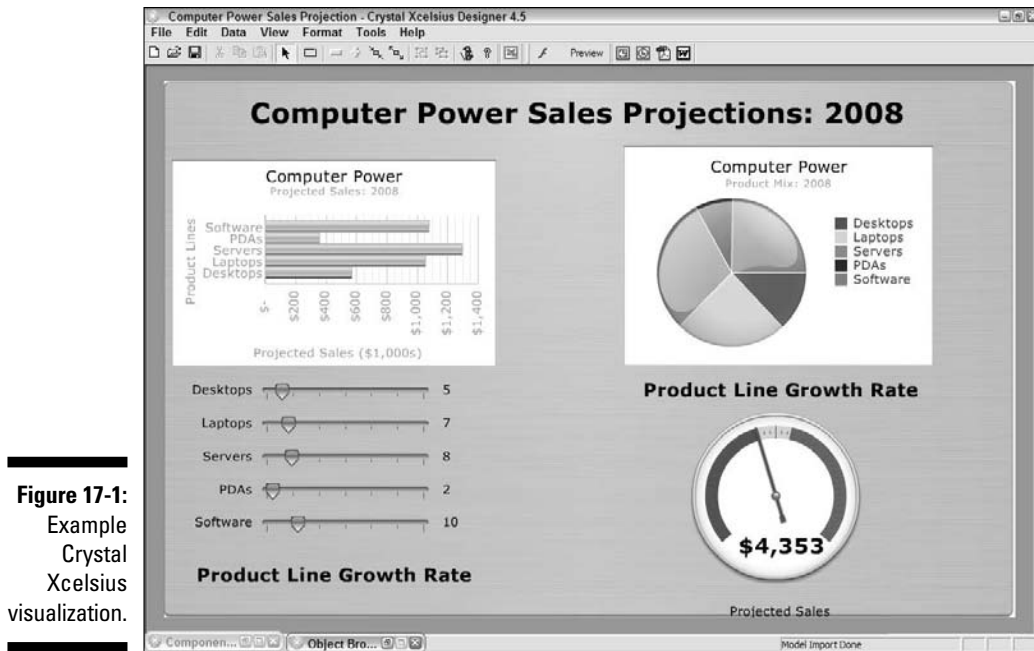
Crystal Xcelsius uses Microsoft Excel as a data source and data modeling tool, and Macromedia Flash Player as a rendering engine. Programmers using Crystal Xcelsius Designer can use the combination of products to compile dynamic visualizations that can then be added to a Crystal report.

Adding Xcelsius Capability to a Report

Although Crystal Xcelsius is a separate product from Crystal Reports 2008, it can add impressive visualizations to a Crystal report. To use Crystal Xcelsius, data from a report's data source must be copied to an Excel spreadsheet file. Xcelsius takes data from the spreadsheet file and creates a Flash visualization of the data in the form of a Flash SWF file. You can either embed the Flash file in your report or link to it.

Placing an Xcelsius visualization in a Crystal Report is a multi-step process. The steps are

1. Copy the data you want to display from your data source to an Excel spreadsheet.

   Of course, if your data source *is* an Excel spreadsheet, you can skip this step.

2. Use Crystal Xcelsius to create a visualization model and then save it to a Flash SWF file.

3. Set up the Crystal Xcelsius model to receive real-time data from Crystal Reports.

   This enables the model to respond the operations on controls, such as slider controls, by the report user.

4. Embed the Crystal Xcelsius model within a Crystal report, or alternatively create a link to it.

Assuming that you already performed Step 1 and that your data resides in an Excel XLS file, Figure 17-2 shows the spreadsheet that serves as the basis for the Xcelsius visualization shown in Figure 17-1.

Figure 17-2: Use an Excel spreadsheet file to create an Xcelsius model.

Creating an SWF file with Crystal Xcelsius

The next step is to create a visualization model with Crystal Xcelsius. Crystal Xcelsius is a separate product from Crystal Reports, and I don't have space in this book to cover that process. For complete details, read through *Crystal Xcelsius For Dummies,* by Michael Alexander (Wiley). Figure 17-3 shows the user interface of Crystal Xcelsius Designer 4.5.

After your Crystal Xcelsius visualization exists as a Flash file, you must set it up to receive input from the Crystal report it's embedded within. This operation is also performed by Crystal Xcelsius. The steps are fairly straightforward and also necessary for Crystal Reports to deliver the interactivity that Xcelsius makes available.
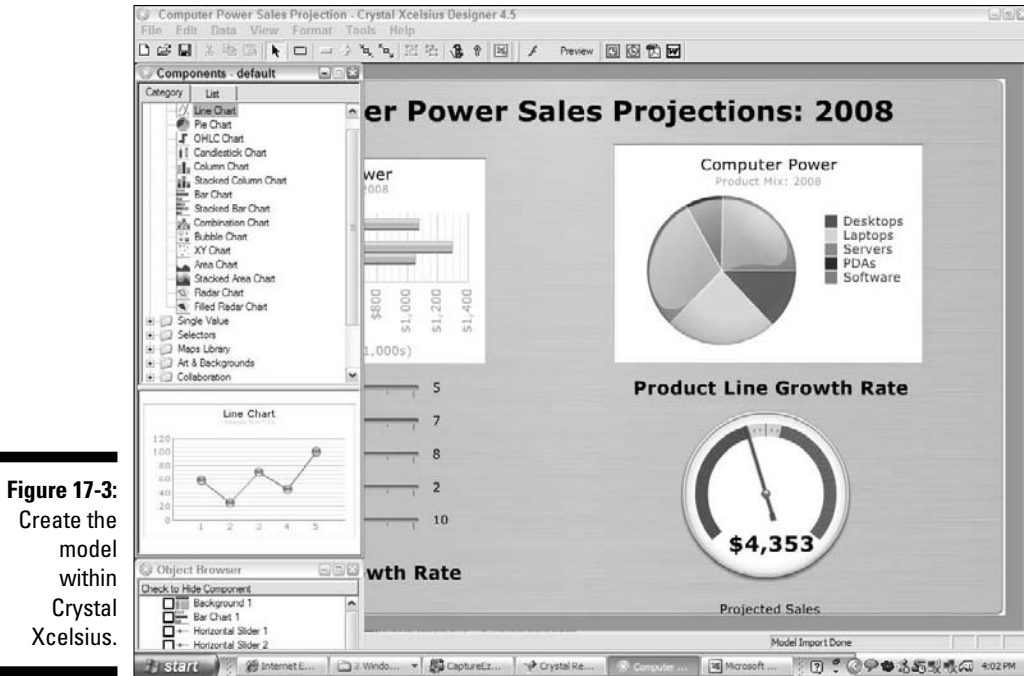
Figure 17-3:
Create the
model
within
Crystal
Xcelsius.

1. **From the Crystal Xcelsius menu, choose File⇨Export Settings.**

   The Export Settings dialog box, shown in Figure 17-4, opens.

2. **Select the Use Flash Variables radio button.**

3. **Select CSV format.**

   CSV stands for comma-separated values. CSV files are just about the simplest data files in existence. They consist of a string of values, separated by commas.

4. **Click the Define Variables button.**

   The Replace Data Selection dialog box, shown in Figure 17-5, opens.

5. **Click Add.**

6. **In the Name text box, replace Range0 with Values.**

7. **Click the select range icon (to the right of the Variable Selection text box) to display the source data spreadsheet.**

   The Select a Range dialog box opens.
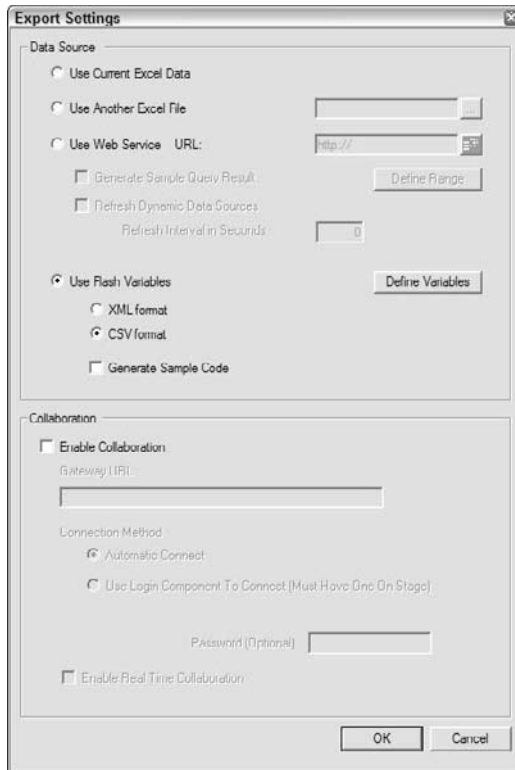
Figure 17-4:
The Crystal
Xcelsius
Export
Settings
dialog box.
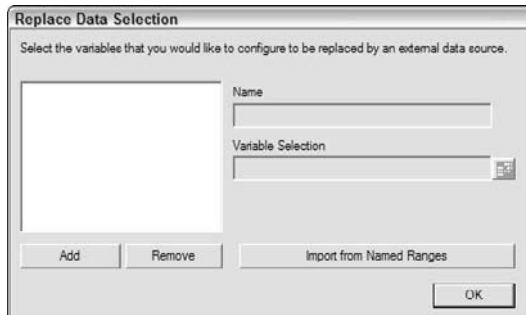
Figure 17-5:
The Replace
Data
Selection
dialog box.

8. **Select the range B5 to F5 in the Select a Range dialog box, as shown in Figure 17-6, and then click OK.**

   You return to the Replace Data Selection dialog box.

9. **Click OK to return to the Export Settings dialog box.**

Figure 17-6:
Select the
range here.

Select a Range

Sheet1!$D$5:$F$5   OK   Cancel
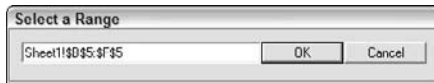
10. **Click OK in the Export Settings dialog box.**

11. **From the main menu, choose File➪Export➪Macromedia Flash (SWF).**

12. **In the Export Macromedia Flash (SWF) dialog box that appears, specify a location and filename, and then click Save.**

Embedding your Crystal Xcelsius model in a Crystal report

After you create an Xcelsius model, you can insert it into a Crystal report. Here's a step-by-step process for doing that:

1. **Start Crystal Reports 2008; under Start a New Report, click Blank Report.**

2. **In Database Expert, connect to your spreadsheet model (if you're not already connected to it) and select the sheet that contains your data.**

3. **With Formula Workshop, click the New icon; from the menu that appears, choose Formula.**

4. **In the small Formula Name dialog box that pops up, enter** BuildValuesString **and then click OK.**

5. **Enter the following formula into Formula Editor:**

```
global stringvar ValuesString;
**
    if
        (ValuesString = "") then
        ValuesString := Cstr({Sheet1_.Projected Sales})
    else
        ValuesString := ValuesString + "," +
            Cstr({Sheet1_.Projected Sales});
ValuesString;
```

6. **Click Save and Close to exit Formula Workshop.**

7. **From the main menu, choose Insert➪Flash.**

8. **From the Insert Flash Object dialog box that appears, do the following:**

   a. Browse for and select the SWF object you exported from Crystal Xcelsius.

 b. Make sure the Embed radio button is selected.

 c. Click OK.

 9. **Locate the placement rectangle in the Report Footer and click the left mouse button to place it there.**

 10. **Click the Flash object on the report to highlight it, right-click it, and choose Flash Data Expert from the menu that appears.**

 11. **In the Flash Data Binding Expert section, click the button with the plus (+) sign.**

 12. **Type** Values **for the variable name, and then click within the Value field to the right of it.**

 13. **To pass the value into the Values Flash variable, click the drop-down button on the text box and select an existing field object to pass to the Flash variable.**

 In this case, select the BuildValuesString formula.

 14. **Click OK to exit the Flash Data Binding Expert.**

You can now switch to Print Preview mode and move the slider controls. As you do, the bars on the bar chart move, the pie segments in the pie chart change proportions, and the needle in the gauge moves to reflect the changing values of the product line growth rates. Figure 17-7 shows the Flash object embedded in the report, after the slider controls have been moved.
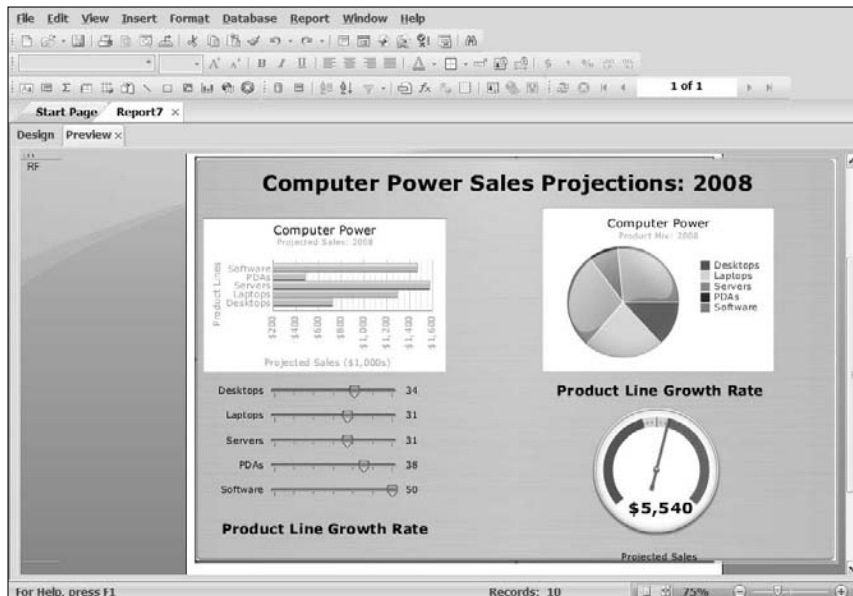
Figure 17-7: Xcelsius Flash visualization within a Crystal report.

Enhancing a Report with the Tasteful Use of Flash

Xcelsius Flash visualizations provide an interactive experience that is directly related to the data being conveyed by a Crystal report. This is probably the most powerful use of Flash in a report. In addition, you can include other Flash objects in your reports, regardless of their origin. Although not bound to the data in the report, they may nonetheless enhance the report's appearance. For example, you could include an animated logo in a report. You could even include an animated movie that illustrates a process or operation.

Viewing Flash visualizations

In order to view a Flash object in a Crystal Report, you must have a viewer that supports Flash functionality. Of course, Crystal Reports 2008 itself supports that functionality, as do .NET Winform, .NET Webform, and Java DHTML viewers.

WARNING!

The free, downloadable Crystal Reports Viewer XI does *not* support Flash. However, Crystal Reports Viewer 2008 might support Flash functionality by the time you read this book.

Dynamic interaction with a report using a Parameter panel

You can add a parameter to a report and issue a prompt to the user to enter a value for the parameter, via the Parameter panel. The following steps create a parameter that appears on the Parameter panel:

1. **Open the Customer Orders by State or District (Mexico) with Map report.**

2. **From Field Explorer, select Parameter Fields, and then right-click it.**

3. **From the contextual menu that opens, choose New.**

   The Create New Parameter dialog box shown in Figure 17-8 is displayed.

4. **Enter a name for your parameter in the Name field.**

   I use Order Lower Limit.

5. **Choose the appropriate data type from the Type field.**

   I selected Currency from the drop-down list.

Figure 17-8:
Create a
new
parameter
here.
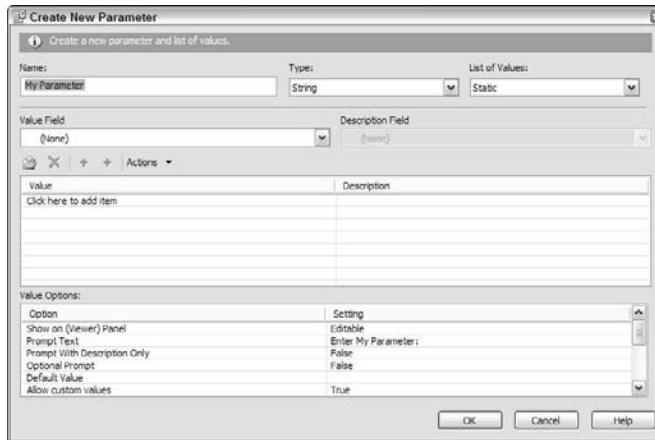
6. **From the Value Field drop-down list, select a value.**

   I selected Order Amount.

7. **From the Description Field drop-down list, select a value.**

   I selected Customer ID.

8. **Click the Actions drop-down indicator and select Append All Database Values.**

   All the applicable values are moved to the Values area. This operation can take significant time for a large table.

9. **In the Value Options area, make sure that the Show on (Viewer) Panel setting is set to Editable, that Allow multiple values is set to True, and that Min Value is set to 500.**

   These settings will establish a lower limit of $500 for Order Amount.

10. **Click OK.**

    The Order Lower Limit parameter field now appears in Field Explorer.

11. **Drag your parameter field onto the report.**

    I dragged mine into report footer RFc. If you don't want it to appear on the report, you could also drag it into a section that is suppressed.

12. **Switch to Preview mode.**

    The Enter Values dialog box opens. The prompt says Please Specify a Currency Value Greater Than or Equal to 500.

13. **Click the double right-arrow to place all qualifying values into the Selected Values pane, as shown in Figure 17-9.**

    This dialog box enables you to select specific values out of all the values that satisfy the condition of being equal to or greater than 500. I chose to select them all.
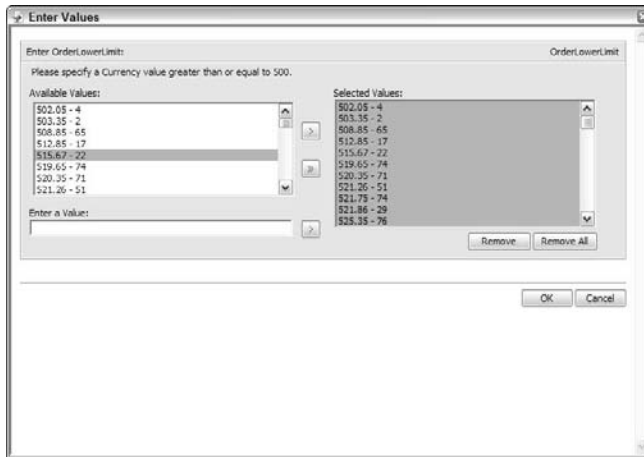
14. **Click OK.**

All the qualifying values appear in the Parameter panel at the left of the window, as shown in Figure 17-10.
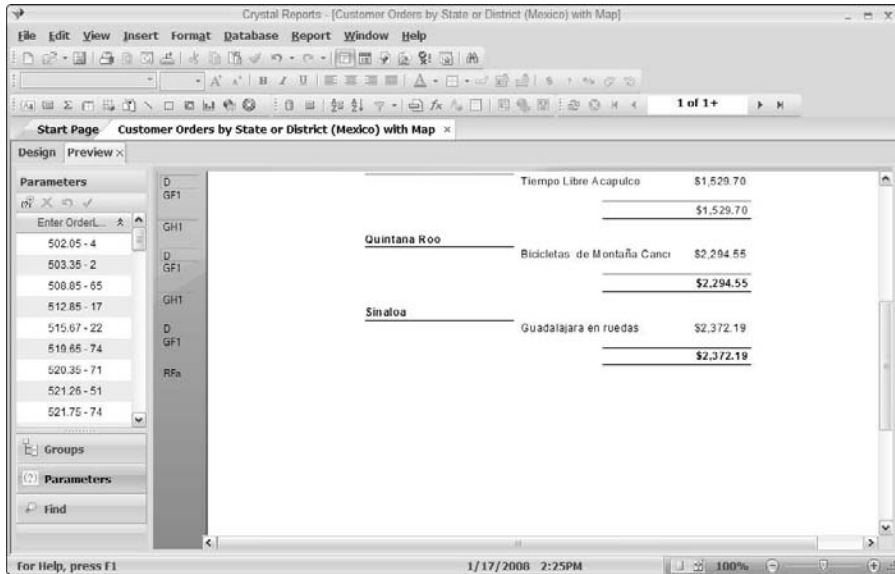
Part IV

Crystal Reports in the Enterprise

The 5th Wave   By Rich Tennant
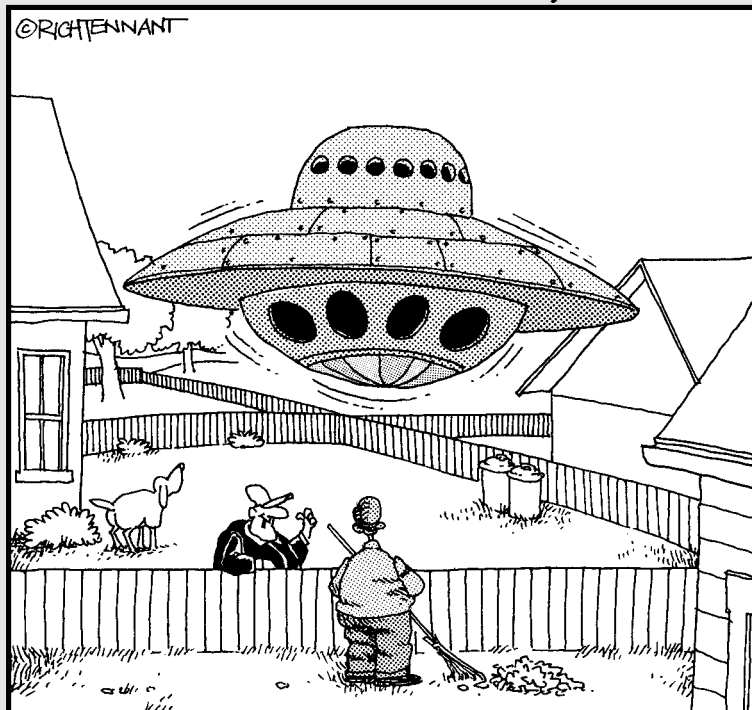
"Well, I got in touch with the Enterprize like you said, and some Kirk guy asked me to keep an eye on this for him."

In this part . . .

Besides being a great standalone report writer, Crystal Reports is an integral part of an enterprise-spanning data retrieval, analysis, documentation, and publishing system. In this part, I show you how Crystal Reports fits into the bigger picture of effective communication in a large organization.

Chapter 18

Crystal Reports Server

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*C*rystal Reports Server XI isn't a single product but rather a collection of tools that work together to provide reporting services to meet the needs of small-to-medium–sized businesses. It covers the gamut from data access through report design to report management and delivery, as well as integrating with web portals and enterprise applications.

The components of the Crystal Reports Server XI system include

✔ Data access services

✔ Crystal Reports XI

✔ Report publishing, security, and processing services

✔ Management tools

✔ Application services for integration with applications

✔ Web services for integration with portals

✔ A simplified user interaction tier

In this chapter, I give an overview of Crystal Reports Server XI, for the sake of completeness, even though it doesn't include Crystal Reports 2008 and indeed doesn't run in conjunction with Crystal Reports 2008. If you work for a small to medium-sized business that has between five and twenty users on your local area network, you might have to deal with Crystal Reports Server, either the current XI version or the 2008 version when it appears.

How does Crystal Reports Server fit in?

Crystal Reports Server XI is not a part of Crystal Reports 2008. It is not even a part of the predecessor of Crystal Reports 2008, named Crystal Reports XI. Crystal Reports Server XI is a separate product, which includes Crystal Reports XI as a subset.

Crystal Reports 2008 and Crystal Reports XI are standalone products designed to run on a single computer. Business Objects XI is an enterprise class business intelligence (BI) platform, which includes Crystal Reports functionality, and runs on large networks. Between those two extremes is Crystal Reports Server XI, which runs on small networks, supporting from 5–20 simultaneous users. As of this writing, there is no Crystal Reports Server 2008, although one is undoubtedly in the works.

Connecting to Data Sources

A report can draw from a number of different types of data sources. A single report might require data from multiple sources, which might be of different types. And different data sources might well require different ways of connecting to them. Crystal Reports Server XI offers all the most widely used connection options.

Connecting directly or indirectly

The simplest and most efficient way to connect to a data source is via direct connection, using a native driver specifically designed to connect to that particular type of data source. Crystal Reports Server XI includes more than 35 of the most popular native drivers for relational, XML, OLAP, and in-memory data. In addition, ODBC, OLE DB, and JDBC indirect connection mechanisms are also supported. That means that you can pull data from just about any data source that you're likely to encounter for use in a Crystal report.

Using Business Views to simplify connectivity

Business Views are features of Crystal Reports Server XI that enable you to create a simple interface for non-technical users. When combined with the security features of Crystal Reports Server, a single report you create can deliver appropriate content to users at several different privilege levels. Each of the reports would contain only data that's appropriate for the particular user to whom it is displayed.

Formatting Reports with Crystal Reports Developer

Crystal Reports Server XI contains the Developer Edition of Crystal Reports XI. You want to use this rather than Crystal Reports 2008 when creating any reports that will be distributed via Crystal Reports Server XI. The report files created by Crystal Reports 2008 contain elements that are not recognized by Crystal Reports XI, and you will be warned to this effect whenever you try to open a report in Crystal Reports XI that was created with Crystal Reports 2008. In all likelihood, the report will still be readable by Crystal Reports XI Server, but some features might not operate as advertised.

Also present in Crystal Reports Server XI is the Crystal Reports Server Repository. The Repository is a central location where you can store report elements, and they will be available for use in any of the reports created in the Crystal Reports Server environment.

Providing Platform Services

Crystal Reports Server XI provides platform services similar to those provided by BusinessObjects Enterprise on larger systems. These services include data processing, document processing, and end-user interactivity. Crystal Reports Server XI includes a communication framework that handles the movement of information between platform services and the software development kits available for Java, .NET, COM, and web services.

Platform services enable users to view and interact with reports, and participate in discussion threads with other users. All users have access to a common schedule, and reports can be distributed based on events, business calendars, or specified intervals.

Publishing and distributing reports

Crystal Reports Server XI includes a Publishing Wizard that you can use to upload Crystal reports to the web. In addition to uploading reports, the wizard also gives you the means to configure report processing schedules, security, parameters, and database logons. By establishing privileges, you can decide who can publish reports and then what the publication destinations can be.

If you have reports that were created with an earlier version of Crystal Reports, use the Publishing Wizard to convert them to Crystal Reports XI format, enabling you to use the full power of Crystal Reports XI Designer to update them.

With the scheduler, you can schedule reports for automatic distribution to FTP servers, e-mail distribution lists, printers, or file servers. You can even simultaneously send different versions of the same report to different recipients, based on different security settings.

Providing security

With Crystal Reports Server XI, you can manage which folders and report objects are available to individual users or defined groups of users. You can use a third-party entitlement database (such as LDAP, Kerberos, or Windows NT/Active Directory) or the integrated Crystal Reports Server security system. You can even use a combination, authenticating some users with one entitlement database and other users with another.

Managing the system

The central management server (CMS) maintains a database that includes information on users and groups, security levels, and reports. With the CMS, you can enforce access rights and the types of tasks users can perform. The CMS also manages the Repository database.

Crystal Reports Server XI stores reports, report instances, and discussion threads in a repository database. This database is virtual, containing pointers, rather than duplicate copies of the items it holds. This provides faster access to the stored information.

The report job server schedules the publication of reports, as well as the format in which the reports will be delivered, and the destinations to which they will be sent.

The page server serves up individual pages upon request. This page-on-demand capability saves you from retrieving an entire report, when the information you seek is all contained on a single page. Network traffic is greatly reduced.

The cache server minimizes the delays inherent in database hits by fulfilling page requests from cache rather than the database, whenever a needed page is present in cache. This happens frequently when a page is

accessed repeatedly. Active data sharing improves performance even more, when different applications use the same pages. Those pages are more likely to be in cache and thus quickly retrievable, because they are more frequently accessed.

Useful Management Tools

Considering all the capability that Crystal Reports Server XI gives you, controlling all that power could be a daunting task. Thankfully, a couple of tools are provided to make that control a lot easier. Those tools are the central management console (CMC) and the central configuration manager (CCM).

The *CMC* is a .NET or Java web-based environment for centralized system management, deployment, and configuration. With it you can set up user roles, security access, server administration, password management, and other administrative tasks. With the CCM, you can view and configure advanced server settings. You can also start, stop, enable, and disable servers. With the CMC and CCM, server managers can keep on top of a dynamic environment with a minimum of stress.

Application Services

The services oriented-architecture of Crystal Reports Server XI gives application developers the tools needed to create and manage multiuser applications. The reporting services are implemented through a set of software development kits (SDKs). With these SDKs, you can build end-user interfaces, and control the handling of application content and its delivery.

Crystal Reports Server XI is tightly integrated with Java and Microsoft-based platforms, using native J2EE, .NET, and web services SDKs. You can install your applications on the most popular application platforms, including BEA WebLogic, IBM WebSphere, Apache, Oracle 10g Application Server, Sun ONE application server, and Microsoft IIS.

Web Services

A web-services SDK, consisting of web-based functions that use .NET or J2EE platforms, is included with Crystal Reports Server XI enabling developers to integrate documents directly into applications. The web services provider is

deployed on the server side with Crystal Reports Server XI. The API (application program interface) provided gives developers the tools to create customized web sites, applications, or web services, which access to services available in Crystal Reports Server XI.

Viewing and Interacting with Reports

Users, typically not in possession of a copy of Crystal Reports, can view reports with *InfoView,* which is a customizable, zero-client web portal. It is a central web environment that enables end users to find reports and then navigate them.

In addition to InfoView, other report viewers are available, including the previously discussed Crystal Reports Viewer XI, as well as a Java viewer, an ActiveX viewer, a DHTML viewer, and an Advance DHTML viewer.

Chapter 19

BusinessObjects Enterprise Repository

*A*s its name implies, *BusinessObjects Enterprise Repository* is a central location where you can store report objects. It delivers two benefits to you as a report developer:

✔ **You can store different types of objects there.** The Repository saves you from reinventing the wheel. After you create an object — a text object, a bitmapped image, a custom function, or an SQL command — you can store it in the Repository. From there, you can add it to any other reports that you or your colleagues create.

✔ **The Repository remains connected to all the reports that have drawn objects from it.** You can take an object from the Repository, put it into a report, update it, and then return it to the Repository. All other reports that contain that object are automatically updated, saving you from having to keep track of which versions of a particular object are in which reports. You have to manually update the object only once, rather than in all the reports that use it.

The Repository is hosted by the central management server (CMS) system database in BusinessObjects Enterprise. Thus, it's only available on systems that include BusinessObjects Enterprise. Standalone copies of Crystal Reports do not have access to the Repository.

WARNING!

The first release of Crystal Reports 2008 doesn't support Repository functionality. After a Service Pack is issued for Crystal Reports 2008 and a new version of BusinessObjects Enterprise is released, this functionality will be supported. This upgrade is expected some time in 2008.

The Repository holds the master copy of any object it contains, and no one can modify that master copy while it's there. To update an object, you must move it into a report, modify it there, and then move it back into the Repository. This eliminates the possibility of object corruption in the Repository from concurrent file access and editing.

Adding Folders to Your Repository

Naturally, keeping objects in the Repository organized allows you to find them more easily when you want to add them to your reports. To impose order, use folders and subfolders in a tree structure in the Repository. You have complete freedom to organize those folders however you want. Follow these steps to add a folder:

1. **In Crystal Reports 2008, open a report — any report.**

2. **On the Standard toolbar, click the Repository Explorer icon.**

   The Log On to BusinessObjects Enterprise dialog box appears.

3. **Log on to BusinessObjects Enterprise.**

   Repository Explorer appears at the right edge of the screen.

4. **Click the Insert a New Folder icon.**

   A new folder appears, with the default name New Folder.

5. **Give the new folder a meaningful name, and then press Enter.**

6. **To create subfolder, select the folder and then click the Insert a New Folder icon.**

7. **Name the new folder.**

Storing Your Valuables in BusinessObjects Enterprise Repository

After you create an object in one report, you can put it into the Repository, where it remains available for reuse in other reports and by other developers.

Adding a report object to the Repository is easy, but the methods differ depending on the type of object. The following sections describe these methods.

Adding text and bitmapped objects to the Repository

To show you how to add a text object or a bitmapped object to the Repository, in this section, I use the Customer Orders by State or District, Mexico report from Chapter 6.

Suppose you plan to create other reports about sales in Mexico, and you want to retain the Mexican flag in the Repository. The flag is an image, but you're likely to be putting other flags in there as well, along with other kinds of images. To keep things straight, you could first create an Images folder, and then create a Flags subfolder of the Images folder. Then you could place the Mexican flag image in the Flags folder, like this:

1. **Add an image to a Repository subfolder by selecting the image and then dragging it to the subfolder in Repository Explorer.**

   For this example, select the image of the Mexican flag and drag it to the Flags folder.

2. **When the Object Information dialog box opens, enter a name for the object.**

3. **(Optional) Add the author's name and a description.**

4. **Click OK.**

   The object is added to the folder in the Repository.

You can verify that the object is in the Repository by clicking the plus sign to the left of your new (in this case, Flags) folder. Your new object now appears in the Repository Explorer tree.

You can add a text object in a similar manner. Just drag it to the appropriate folder in Repository Explorer and name it. From that point on, the object resides in the Repository, still connected to the report you took it from.

Adding custom functions to the Repository

You can create custom functions for use in the formulas you create with Formula Workshop. (I cover Formula Workshop and creating custom functions in Chapter 10.)

TIP

Putting custom functions in the Repository so they can be reused is a great labor saver.

Adding a custom function to the Repository from Formula Workshop is easy; just click the Add to Repository icon in Formula Workshop.

Adding SQL commands to the Repository

Relational databases are created and manipulated by commands in SQL. You can add such commands to the Repository in much the same way you would add text objects, image objects, or custom functions. In Chapter 23, I give an overview of SQL commands and describe how to create one. For a more complete exposition of SQL, refer to my book *SQL For Dummies* (Wiley).

For now, here's how to add an existing SQL command to the Repository, where it will be readily available next time you need it:

1. **In the Selected Tables pane of Database Expert, find the command you want to add to the Repository.**

2. **Right-click the command and choose Edit Command.**

   The Modify Command dialog box appears.

3. **Select Add to Repository, and then click OK.**

   The Add Item dialog box appears.

4. **Specify a name and Repository location for the command.**

   The command appears in the Repository node of Database Expert, the Set Datasource Location dialog box, and the Data screen of Report Creation wizards.

Using Repository Objects in a Report

Moving an object from the Repository to a report is essentially the reverse of moving an object from a report to the Repository. There is one method for text and image objects, a second method for custom functions, and a third method for SQL commands.

Adding text objects and images

To add a text object or an image object from the Repository to a report, follow these steps:

1. **On the Standard toolbar, click the Repository Explorer icon.**

2. **Log on to BusinessObjects Enterprise, if you've not already done so.**

3. **Expand the folder you want to place your text object or image into, whichever is appropriate.**

4. **Drag the desired object into your report where you want it.**

    That's all there is to it.

Adding custom functions

Adding a custom function from the Repository to a report is only a little more complicated than adding text objects and images:

1. **On the Expert Tools toolbar, click the Formula Workshop icon.**

2. **In Formula Workshop, expand the Repository Custom Functions node.**

3. **Right-click the desired custom function and choose Add to Report.**

    The function is added to the report. If the function you added requires other functions for its operation, those functions are automatically added, too.

Adding SQL commands

Adding an SQL command from the Repository to a report is similar to adding a custom function:

1. **On the Expert Tools toolbar, click the Database Expert icon.**

2. **In Database Expert, expand the Repository folder.**

3. **Right-click the command you want to add and then choose Open.**

    Your command appears in the Available Data Sources area of Database Expert. Add it to your report as you would any other data source.
    I cover SQL commands more extensively in Chapter 23.

Modifying a Repository Object

After an object is in the Repository, you can include it in multiple reports. When a user opens these reports, the Repository is checked to see whether

the object has been updated since the last time the report was open. If the object has been updated, the new version of the object is downloaded to the report.

You don't have control over when other users might open a report containing an object you want to modify, so Crystal Reports doesn't allow Repository objects to be modified. To update (or otherwise modify) a Repository object, you must first disconnect the object from the Repository, and then change the object. Then, after the change is complete, you can add the object back to the Repository. The next time anyone opens a report that contains that object, your updated object is the one supplied.

To modify an object in the Repository, follow these steps:

 1. **Open a report in Design view.**

    You might want to open the Mexico Orders, with Running Totals Sorted by Date report from Chapter 6. However, for this example, any report will do.

 2. **Drag the object you want in your report from the Repository to your report.**

    For this example, from the Flags folder of BusinessObjects Enterprise Repository, drag the Flag of Mexico object to the left edge of the Report Header.

 3. **In Design view in the report, right-click the object you just dragged into the report and choose Disconnect from Repository.**

 4. **Right-click the flag object again and choose Format Graphic from the menu that pops up.**

    Format Editor appears.

 5. **Modify the object.**

    For example, you could click the Border tab and change the Left, Right, Top, and Bottom Line styles to Single, and then click OK.

 6. **Drag the modified graphic object from the report back to the Flag of Mexico icon in Repository Explorer.**

    The Add or Update Object? dialog box appears.

 7. **Click the Update button, and then click OK.**

    The Modify Item dialog box appears.

 8. **Click OK.**

    The Mexican flag in the Repository now has a single black line border around it.

Deciding Whether to Update Reports Automatically

To automatically update or not? That's an important question, and each choice has its argument.

To guarantee that all reports using a Repository object are using the same version, consider setting an organization-wide policy that whenever a Repository object is updated, all the reports that use that object receive the update the next time they're opened.

On the other hand, people who create reports might not want to surrender control of their report to whomever makes a Repository update. They don't want their reports to be automatically updated when opened after a Repository update.

Crystal Reports can be configured to work in either of these two ways. In addition, you can decide — on an individual basis — whether you want a specific report to receive updated Repository objects.

To have all reports that use Repository objects receive updated objects when they're opened, configure Crystal Reports in the following manner:

1. **Choose File⇨Options.**

   The Options dialog box appears.

2. **Click the Reporting tab.**

3. **Select the Update Connected Repository Objects on Open option.**

4. **Click OK.**

   From now on, whenever any report is opened, the version numbers of the Repository objects it contains are compared against the current version numbers of those objects in the Repository. If the Repository contains a newer version, it replaces the older version in the report.

REMEMBER

If you don't want the automatic update feature, make sure that Update Connected Repository Objects on Open is *not* checked.

To update the Repository objects in a single report — rather than globally for all reports — note the dialog box that you use to open a report. At the bottom of that dialog box is an option that reads Update Repository Objects. Repository objects will be updated on the report you open, but not on any others.

Deleting Objects from the Repository

Sooner or later, Repository objects become obsolete and should be deleted. Removing a Repository object is simple. You can do it in three easy steps:

1. **On the Standard toolbar, click the Repository Explorer icon.**

2. **Move to the appropriate folder in the Repository Explorer and select the object you want to remove.**

3. **Press the Delete key, and then click the Yes button to respond to the Confirm Delete dialog box.**

   The object is removed.

Any existing reports that already include a deleted object still contain it, but the object can't be included in any other reports from this point on.

Of course, you don't want just anyone deleting Repository objects that other people might want to continue using in their reports. How do you control who has permission to delete Repository objects?

Fortunately, the Repository is stored in a relational database, and relational databases have built-in protections against unauthorized tampering. One of those protections is basic to the database's structure: The database administrator (DBA) assigns permissions to all users. One of those permissions is the right to delete records from database tables. Only those users who are granted permission to do so may delete objects from the Repository. (Naturally, the DBA should choose such people with care.)

Chapter 20

Navigating with Report Parts

. . . .

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*R*eport Parts allows developers to extract and display only selected parts of a report *(report objects)* while the rest of the objects on the source pages are not displayed. With Report Parts, advanced developers can integrate key elements of an existing report — such as summary data, tables, and charts — into workflow applications that users can access through a Web portal, PDA, cell phone, or other wireless device.

In this chapter, I discuss the two ways you can use Report Parts:

✔ **Report Part Drill-down:** This method uses a drill-down capability that is a more restricted method than the standard drill-down available when you perform regular page navigation.

✔ **Another Report Object:** This method involves defining a hyperlink path to other objects in the same report (or in a different report).

REMEMBER

Using the Report Parts facility requires the use of a scripting language, such as VBScript, to create the Report Parts Viewer. After you create the Report Parts Viewer, you integrate it into the HTML code that produces the Web application that actually presents the Report Parts to your audience.

Understanding Report Parts Navigation

The Report Parts facility allows you to focus attention on the specific parts of a report that are relevant to a given user community. By crafting different Report Parts for different user communities, you can address multiple audiences with a single report. The members of each audience see only the information that concerns them; other parts of the report aren't displayed.

You can view reports in several ways:

✔ **Through the Crystal Reports development environment:** Keep in mind, however, that not everyone who needs to view the reports will be a report designer. Those who are not designers won't have Crystal Reports.

✔ **Through BusinessObjects Enterprise via the BusinessObjects Enterprise Web desktop (InfoView):** Users employing this method need only a browser and the assigned privileges of a licensed BusinessObjects Enterprise *seat.* Seat? What's a seat? In Business Objects marketing lingo, the price of a BusinessObjects Enterprise license is based on the number of seats it supports. This is the number of people who are parked in front of computers running BusinessObjects Enterprise at any one time.

✔ **Through a viewer:** Viewers are available via the standalone Report Application Server (RAS). (See the nearby sidebar, "What's a Report Application Server?" for more information.) The Crystal Reports Viewer works offline and need not be connected to anything. All it needs is the report file. Chapter 22 describe the Crystal Reports Viewer in detail.

Most of the viewers available are *page viewers,* which are programs that display entire report pages. However, the *Report Parts Viewer* shows only specific report objects, without showing the rest of the page the objects are on. With the Report Parts Viewer, a user can see one part of a report and then click a link to go to another part of the same report (or of a different report) to get specific related information. Thus, you can give users exactly the information they need, whichever report it's in.

The Report Parts Viewer is not a preexisting tool in the way that the Crystal Reports Viewer is. To embed the Report Parts Viewer in a Web page, you must first invoke it with an ASP or a JSP page (written in VBScript or JavaScript, respectively). I don't go into those details here. Writing ASP or JSP pages is more related to building Web sites than to creating Crystal Reports documents. You might want to concentrate on mastering Crystal Reports for the time being, and let a Web guru do the ASP or JSP coding.

Using Report Parts to Navigate a Report

You can move from one report object to another via a hyperlink. For such navigation to work, however, the second report must be managed by BusinessObjects Enterprise or by the standalone RAS. This type of navigation is available only in the DHTML viewers, which are zero-client, server-side viewers. You can link directly from an object in one report to an object in another report.

What's a Report Application Server?

Report Application Server (RAS) is a software tool included with Crystal Reports, designed for building, customizing, and delivering reports over a network. In conjunction with its SDK (software development kit), RAS connects to a Web server to provide users with access to Crystal Reports. RAS is more of a tool for system administrators — you probably won't be using it.

A *zero-client, server-side viewer* requires nothing on the client machine other than a browser. The viewer itself resides on the server.

The Report Parts Viewer and any of the page viewers both support navigation, but what the user sees is different in the two cases:

✔ **Using Report Parts Viewer:** When users are navigating between Report Parts (using the Report Part Viewer), they link from one report object to another report object. Both report objects are designated as Report Parts: The only things that the users see when they follow a chain of hyperlinks. The rest of the page remains out of view.

✔ **Using a page viewer:** When users view a report with a page viewer and the report uses page navigation, they are linked from one object to another, but can see the entire page that these objects are on. Chapter 22 covers the Crystal Reports viewer, which is an example of a page viewer.

You set up the navigation from the Hyperlink tab of the Format Editor dialog box. I illustrate this action with a couple of examples in the following sections.

Using the Report Parts Drill-down method

Drill-down is a standard capability of regular page navigation (see Chapter 6 for more about drill down), but Report Parts drill down is more restricted. The Report Part Viewer emulates the drill-down functionality of Crystal Reports but doesn't provide full drill-down capability. You can drill down from summary fields, group charts and maps, and fields in a report's group headers and group footers. Report Parts drill down from or to objects in a report's page header or page footer is not supported. Furthermore, all *destination objects* (the objects you are linking to) must be in the same report section.

Performing a Report Part drill down involves three steps:

1. Define the Initial Report Part settings.

2. Create a Report Part Drill-down hyperlink.

3. Publish the report into the BusinessObjects Enterprise environment.

After these steps are completed, the Report Part is ready for viewing. Following is a step-by-step example of Report Part Drill-down.

Defining Initial Report Part settings

The first thing you must do is define the Initial Report Part settings:

1. **Open the report that holds the first Report Part.**

   You define its default home object as the starting point of the Report Parts Drill-down.

   For this example, open the Customer Orders Grouped by State or District with Drill-down report created in Chapter 6. In Design view, it looks similar to Figure 20-1.

2. **Right-click the object you want to set as the default home object and then choose Copy from its shortcut menu.**

   For this example: In Design view, right-click the text object in the Report Header (RH) and choose Copy from its shortcut menu.

3. **Choose File⇨Report Options.**

   The Report Options dialog box appears. See Figure 20-2.

4. **In the Initial Report Part Settings area, click the Paste Link button.**

   The Object Name and Data Context fields are filled in automatically with the name and data context of the home object you selected.

5. **Click OK.**
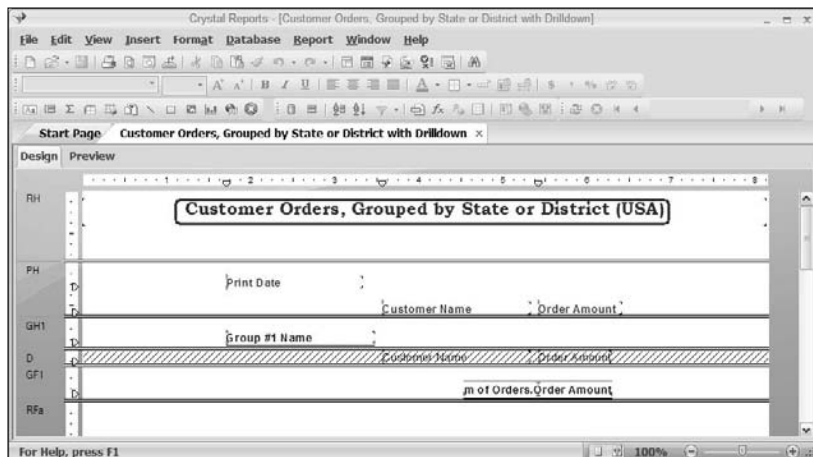
Figure 20-1:
Open a report to begin.
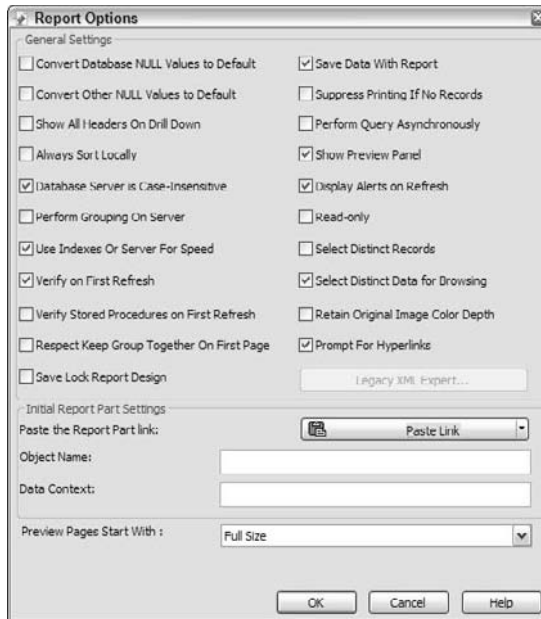
Creating a Report Part Drill-down hyperlink

After your initial Report Part setting is in place, you can create a Report Part drill-down hyperlink. You can link to another location on the source report, or you can link to a location on a different report. To keep this example simple, link to another location on the same report:

1. **Right-click the object that you selected to be the destination of the hyperlink.**

   For example, if you're using the Customer Orders Grouped by State or District with Drill-down report, right-click the Group #1 Name field in the GH1 report section.

2. **From the pop-up menu that opens, choose Format Field to display Format Editor.**

3. **Click the Hyperlink tab, as shown in Figure 20-3.**

4. **In the DHTML Viewer Only area, select Report Part Drilldown.**

   The Hyperlink information area appears, showing a Details entry in the Available Fields pane.

5. **Expand the Details entry to see what fields are available as destinations for the link, as shown in Figure 20-4.**

6. **Select the field you want to use as the destination of the hyperlink and move it over to the Fields to Display pane.**

To follow along with the example, select CustomerName1 and then click the > button pointing to the Fields to Display pane. In this case, you want to display only the names of the customers, not the amount they have ordered.

Figure 20-3:
The
Hyperlink
tab of the
Format
Editor.
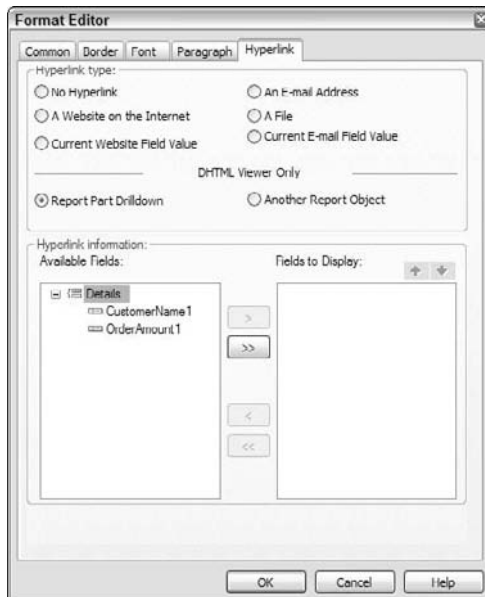
Figure 20-4:
Choose your
destination.

7. **Click OK to establish the hyperlink and dismiss the Format Editor.**

8. **Choose File⇨Save As.**

   For this example, save the file as Customer Orders, Grouped by State or District with Drilldown and Hyperlink.

9. **In Preview mode, double-click the destination object, only the underlying details for that report part are displayed. You do not get any of the other objects that would normally be on the page.**

   For this example, double-click the Group #1 region name for a particular state.

   A drill down of the report part you specified displays.

You now have a report in which drill down displays only the data you want to display rather than whole pages. Your users can access the data through a Report Parts Viewer that's embedded in an application that they're using.

Publishing a Report Parts Drill-down report

Before a user out on the network can view the report, you must publish it into the BusinessObjects Enterprise environment for access over the network. I do not cover BusinessObjects Enterprise in this book. *BusinessObjects XI Release 2 For Dummies* shows you how to publish your report on a network.

Using the Another Report Object method

Report Part Drill-down is one of the two ways you can use Report Parts. The other way is to select Another Report Object. With this option, you can define a hyperlink path to objects in the same report or in a different report. If you're defining a path to a different report, that report must either be open in the same instance of Crystal Reports as the first report (managed by BusinessObjects Enterprise), or it must be part of a standalone Report Application Server environment. As with Report Part Drill-down, all destination objects must reside in the same report section. Linking to another report is very similar to creating a Report Part Drill-down report.

To link from one report object to another report object in either the same or a different report — and this need not be a drill-down operation — follow these steps:

1. **Open the source and target reports.**

   The *source report* is the one you copy an object from. The *target report* is the one you add the hyperlink information to.

   For this example, the source report is Customer Orders by State or District (Mexico), and the destination report is Customer Orders, Grouped by State or District (USA).

2. **In the source report, right-click the destination object and choose Copy from its shortcut menu.**

   For this example, the destination object is the Mexican flag graphic.

3. **Select the intended home object in your target report, and then right-click it and then select Format Field from the shortcut menu.**

   I use the Print Date object as the home object in the Customer Orders, Grouped by State or District (USA) report.

4. **In Format Editor, click the Hyperlink tab and then select the Another Report Object radio button (in the DHTML Viewer Only area), as shown in Figure 20-5.**

5. **In the Hyperlink Information area, click the Paste button.**

   The Report Title, Object Name, and Data Context fields are automatically filled in.

6. **Click OK.**

   A hyperlink is established between your home object and a destination object. Now you can create a series of hyperlinks in the same manner, allowing users to move from one object to the next, to the next, using a Report Part Viewer.
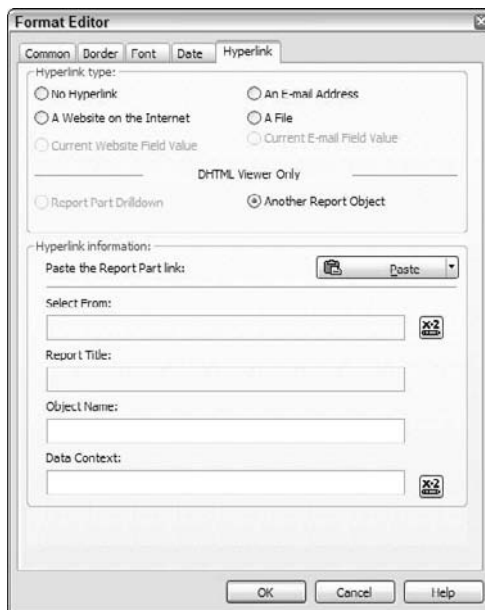
Figure 20-5: The link between objects is selected.

Part V
Publishing Your Reports

The 5th Wave   By Rich Tennant
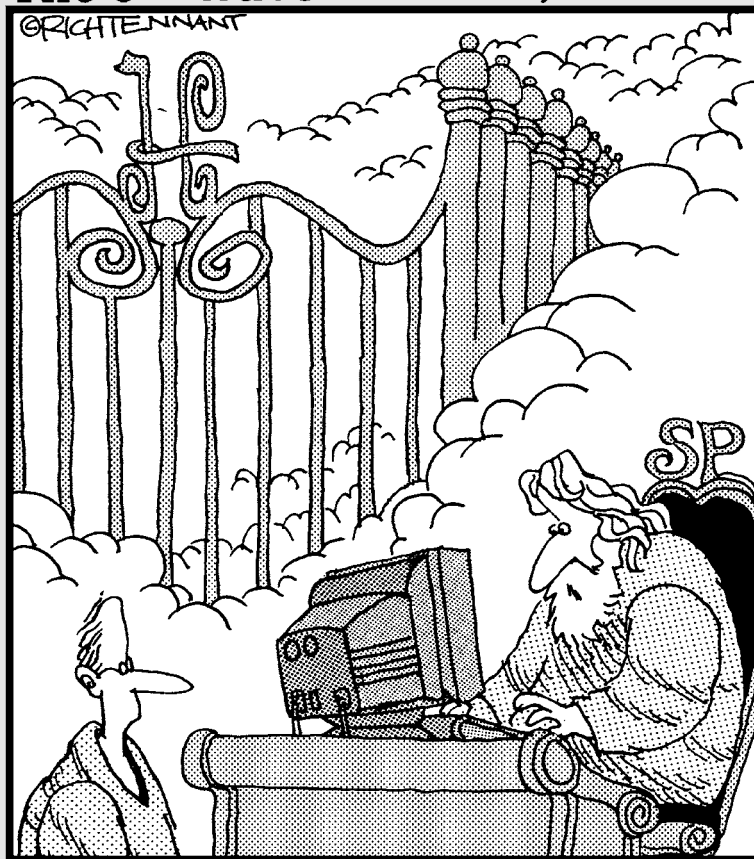
"Why is this report on your charitable donations blank?...Oh. Mr. Peterson, I have some bad news."

In this part . . .

*Y*ou will have a fine sense of accomplishment after you complete an excellent report that clearly conveys the information that you intended to deliver. However, your efforts are for naught if no one reads the report. Publishing your report to its intended audience is an important final step in the report-creation process.

You can publish a report via various methods. You can make the report available on your organization's local area network (LAN), or you can print copies on a printer and distribute them. Maybe you fax the report to people at remote sites or put it on a Web site. Crystal Reports supports all these methods of report distribution. Your handiwork will be visible to all who should see it. And in the case of posting on a Web site, your handiwork will be visible to the world.

Chapter 21

Sending Your Reports Out into the World

● ●

● ●

*W*hen creating a report in Crystal Reports, your ultimate goal is to get the report into the hands of people who can use the information that the report contains. These people might not have access to a computer running Crystal Reports, so several methods of distributing reports are available that don't depend on Crystal Reports being present. For example, you can print the report on paper, send it directly from your computer via fax, or export it to a variety of destinations.

Whether you're distributing your report as a printed document, fax, or computer file, Crystal Reports makes it easy for you to get the report out in a timely fashion and in the form you want.

Printing Your Report

After you complete report development, your report is ready to print, which is the easiest way to produce a finished report. Choose File⇨Print⇨Printer from the main menu or click the Printer icon on the Standard toolbar. The Print dialog box (as shown in Figure 21-1) appears, telling you the name of the default printer and asking you which pages to print, how many copies to print, and whether to collate copies.
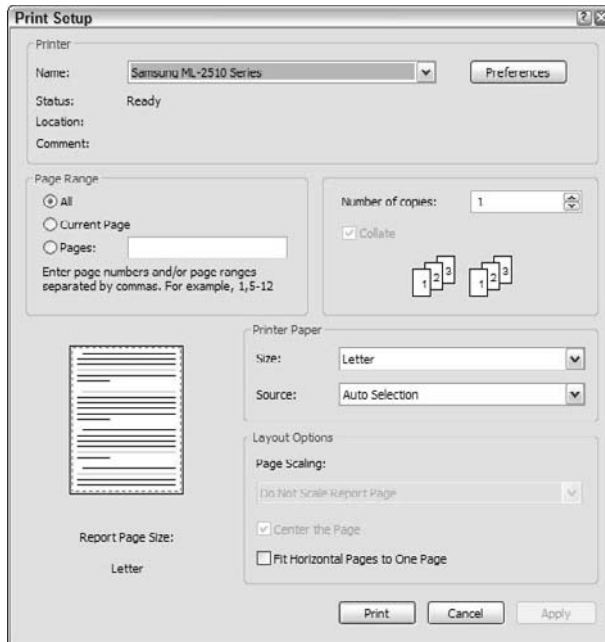
Make the appropriate selections and then click OK. That's all there is to it. Your report is printed as you specify. Distribute the printed copies to the people who should get them. Now your job is truly finished.

Faxing a Report

Maybe the intended recipients of your report aren't close enough for you to hand them a printed report, and a delivery service isn't fast enough to get it to them when they need it. In this case, you can fax the report directly from your computer, provided (of course) that your computer is equipped with fax software and either has a modem connection to the telephone network or is set up to send faxes over the Internet.

To fax a report, you must change your default printer to a fax driver. Do this as follows:

1. **Choose File➪Printer Setup.**

2. **Select your fax driver from the list of printer drivers installed on your computer.**

If you don't find a fax driver among the list of installed printer drivers, it probably means that your computer isn't set up to send faxes. You have to install fax software before you can fax any reports to recipients at remote sites.

3. **Click OK.**

4. **Click the Printer icon.**

   The Print dialog box appears. Your fax driver appears instead of your printer driver.

5. **Make the appropriate selections and then click OK.**

   Your fax software appears.

6. **Follow the software's instructions to send your report to its intended recipients.**

Exporting a Report

Crystal Reports can send reports to a variety of destinations, in a format that's appropriate for those destinations. You can export a report to Microsoft Excel as a spreadsheet in Excel `.xls` format or to Microsoft Word as a word processing document in Word `.doc` format. That's just scratching the surface, however.

Export format types

The two broad categories of export formats are page-based and record-based. *Page-based formats* try to produce an output that looks like the report, as much as possible, given the limitations of the format type. This includes such attributes as font style, text color, text alignment, background color, and so on. These formats also try to retain such layout features as object position, object size, and the relationships between objects. Page-based formats are the ones you will probably use if you expect people to be reading the exported report.

Record-based formats are more concerned with transmitting the data than they are with how it is presented visually. Some formatting might be exported along with the data, but a report exported in a record-based format won't look very much like the original. Record-based formats are primarily used when you do not expect people to read the exported report. Instead, the export is going to another software package, which will operate on the data before presenting it to a human.

Table 21-1 lists the file-format types to which you can export a report.

Table 21-1	File-format Types to Which You Can Export a Report
Page-based	Adobe Acrobat (PDF)
	Crystal Reports (RPT)
	HTML 3.2
	HTML 4.0
	Microsoft Excel 97–2003
	Microsoft Word 97–2003
	Microsoft Word 97–2003 (Editable)
	Rich Text Format (RTF)
Record-based	Microsoft Excel (97–2003) Data-only
	ODBC
	Record style: Columns with Spaces
	Record style: Columns without Spaces
	Separated Values (CSV)
	Tab-separated text (TTX)
	Text (TXT)
	XML

WARNING!

When you export a report to any format other than Crystal Reports format, you might lose some or all of the report's formatting. Crystal Reports tries to retain as much formatting as possible, but in some cases, not much can be saved.

Here are some facts about each of the supported export formats.

Adobe Acrobat (PDF)

PDF format is a page-based format; thus, a report exported in the PDF format looks much like what the report looks like onscreen in preview mode. The PDF format embeds TrueType fonts in the exported document but does not support non-TrueType fonts. TrueType fonts are the most common fonts available under Mac OS and Windows. They are a scalable, outline font that looks good at any resolution, whether on paper or onscreen.

Crystal Reports (RPT)

Exporting in Crystal Reports RPT format is much like saving a report as an RPT file. The difference is that when you export a report that you modified to an RPT file, the original report RPT file is not affected.

HTML 3.2 and HTML 4.0

The HTML export formats are page-based. HTML 4.0 preserves both layout and formatting, using DHTML. HTML 3.2 doesn't do as good a job of preserving layout, but it's supported for compatibility with older browsers. If you have any images in your report, they are saved to separate files and hyperlinked to the report.

Microsoft Excel (97–2003)

Microsoft Excel format is another page-based format. It places report contents into spreadsheet cells on a page-by-page basis. Excel has a 256-column limit, so any report that requires more space is truncated. Excel format retains most formatting but does not export line and box objects.

Microsoft Excel (97–2003) Data-only

Microsoft Excel Data-only is a record-based format. It exports the data, some formatting, and summaries that are compatible with Excel functions, such as SUM, AVERAGE, COUNT, MIN, and MAX.

Microsoft Word (97–2003)

Microsoft Word format is, of course, page-based. It produces an RTF (Rich Text Format) file. The RTF file can contain drawing objects as well as text. Individual objects are placed in text frames. This capability comes in handy for fill-in forms. Empty text objects are reserved for entering text.

This format retains almost all formatting but does not allow text objects to be placed outside the left edge of the page. This shouldn't be a problem because most people would not *want* to place anything off the edge of the page.

Microsoft Word (97–2003) Editable

This format is page-based, but not all layout and formatting are preserved. For example, background color and fill pattern don't carry over. On the plus side, an entire document in this format can be edited by Microsoft Word.

ODBC

ODBC is a record-based data exchange format. Use it to export to an ODBC-compliant database.

Record Style – Columns with Spaces

This record-based format exports report data as text, only from Group and Details areas. Output is one line per record, with spaces between the columns.

Record Style – Columns without Spaces

This format is like the preceding except that it doesn't have spaces between columns.

Rich Text Format (RTF)

Rich Text Format is Microsoft Word format, disguised to appear to be non-proprietary.

Separated Values (CSV)

Separated Values format is a record-based format where each value is separated from others by an agreed-upon separation character, such as a comma. If the separation character is indeed a comma, CSV stands for Comma Separated Values.

Tab Separated Text (TTX)

Tab Separated Text format is a record-based format similar to Text format. It preserves formatting to an extent, but multiline text objects are exported to a single line, and all string values are enclosed in double quotes (" ").

Text

Text format is a record-based format whose output is plain text. Formatting is not retained. This format assumes that a font of a constant dimension is used throughout. You can specify a page break after a specified number of lines. This might or might not correspond to the pagination of your report.

XML

XML format is record-based and uses the Crystal XML schema.

Export destinations

You may export a report to several destinations:

- ✔ An application
- ✔ A disk file
- ✔ A Microsoft Exchange folder
- ✔ Lotus Domino
- ✔ Lotus Domino Mail
- ✔ MAPI (Microsoft Mail)

To demonstrate the export process, export a report in Microsoft Excel format to all the supported export destinations.

Exporting to an application

If you export to an application such as Microsoft Word or Microsoft Excel, Crystal Reports exports to a temporary file and then launches the target application and opens the report file in it.

Here's how to export a report to a Microsoft Excel file, as an example.

1. **Open the report you want to export.**

   To follow along with this example, open Customer Orders, Grouped by State or District (USA), which should look something like Figure 21-2.
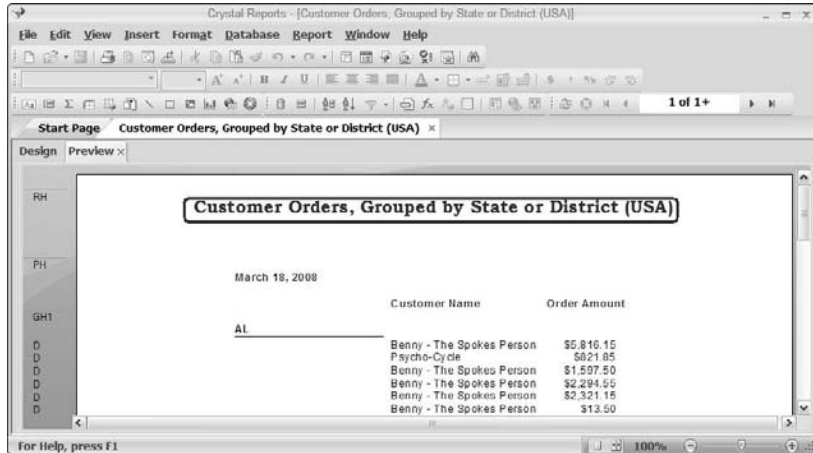
2. **Choose File⇨Export⇨Export Report.**

3. **From the Format menu, select Microsoft Excel (97–2003).**

4. **From the Destination menu, select Application.**

   The Export dialog box looks like Figure 21-3.
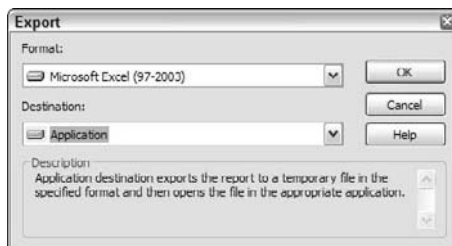
Figure 21-3: Specify your format and destination.

5. **Click OK.**

   The Excel Format Options dialog box is displayed (see Figure 21-4).

Figure 21-4:
The Excel
Format
Options
dialog box.
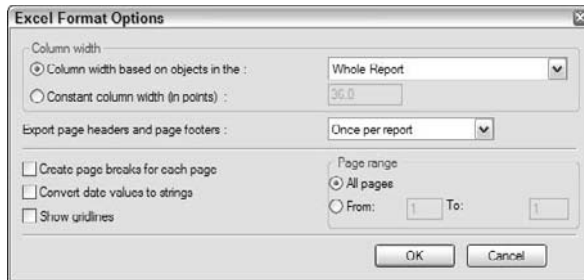
6. **Choose from these formatting options:**

   • Column widths based on the whole report, or any of the individual
     sections of it

   • Page headers and footers once per report, on each page, or none
     at all

   • Page breaks for each page

   • Converting date values to strings

   • Showing gridlines

   I chose to export the whole report, export page headers and footers on
   each page, and create page breaks for each page.

7. **Click OK.**
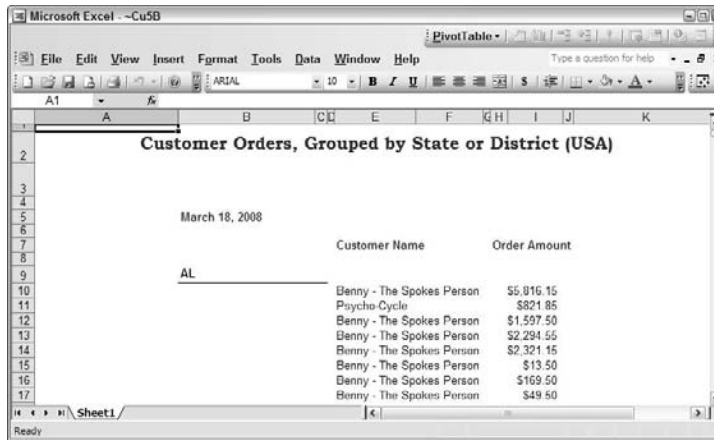
   The Exporting Records dialog box appears. It gives a running count
   of the number of records exported and the percent of completion.
   Figure 21-5 shows it in mid-export.

Figure 21-5:
Records
are being
exported.

Excel is launched, and the exported report is displayed. Figure 21-6
shows the result.

The exported report looks very much like the original. Every line on the
report is displayed in a row of the spreadsheet. Spreadsheet columns
vary in width, depending on the width of the report objects. The only
clearly visible difference from the original report is the fact that the
rounded box around the report title was not exported.

Exporting to a disk file

If you export to a disk file, Crystal Reports opens a dialog box that allows you to specify a drive, directory, and filename for the report file. Here's an example of that operation.

1. **Open the report that you want to export.**

2. **Choose File➪Export➪Export Report.**

   Alternatively, you could click the Export button on the Standard toolbar.

   The Export dialog box appears.

3. **Select a format.**

   For this example, choose Microsoft Excel (97–2003).

4. **Select a destination.**

   For this example, choose Disk File.

5. **Click OK.**

   The Excel Format Options dialog box appears. Gee, this all seems very familiar to the preceding step list. Exporting to disk is pretty much the same as when exporting to Excel.

6. **Select the appropriate options and then click OK.**

   The Select Export File dialog box appears, as shown in Figure 21-7.

   The dialog box assumes that you want to save the exported report in a folder named Temp. This is probably not where you want to save it.

7. **Move to the folder that you want to hold the exported report and then click Save.**

   Your exported report is saved in Excel format and can now be opened in and operated on by Excel.
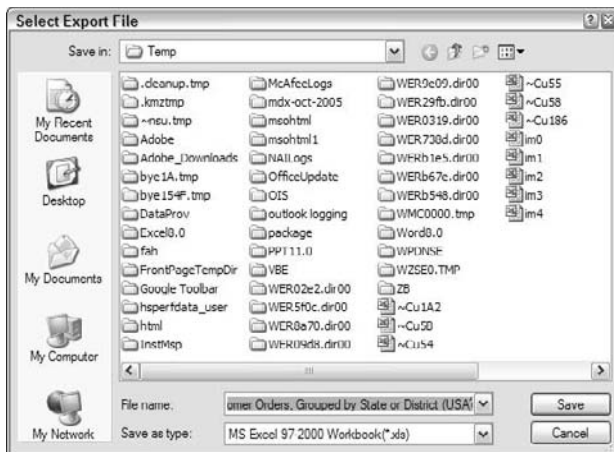
Figure 21-7:
Select
Export File
dialog box.

Exporting to a Microsoft Exchange folder

To export to a Microsoft Exchange folder, start by opening a report. Then display the Export Report dialog box, and select a format and destination. (See the preceding sections if all this is unfamiliar turf.) Then do the following, assuming that you're exporting in Excel format:

1. **Select a format of Microsoft Excel (97–2003).**

2. **Select Exchange Folder for the destination.**

3. **Click OK.**

   Déjà vu strikes again! The Excel Format Options dialog box appears.

4. **Choose appropriate formatting options and then click OK.**

   Figure 21-8 shows the Choose Profile dialog box that appears, if one or more profiles already exist.

Figure 21-8:
The Choose
Profile
dialog box.

TIP

If it doesn't appear, probably no profile has yet been created, and you see the message shown in Figure 21-9.

Figure 21-9:
Microsoft
Office
Outlook
dialog box.

No profiles have been created. To create a new profile, use the Mail icon in the Control Panel.

OK

5. Choose a profile (as in Figure 21-8) and then click OK.

The Select a Folder dialog box appears.

6. Select the folder that you want to direct the exported report to and then click OK.

The export takes place, and your report is located in the folder you designate.

Exporting to Lotus Domino

Exporting to Lotus Domino starts off in much the same way as do the exports cited earlier. The first difference is that in the Export dialog box, select Lotus Domino as the destination. After you click OK, the same-old, same-old Excel Format Options dialog box is displayed. Assuming you are still exporting in Excel format, fill out the options as in the earlier step lists and then click OK.

At this point, if you don't have Lotus Domino on your system, you receive an error message that reads `Couldn't load NROUTERL.DLL`. If you do have Lotus Domino on your system, the Select Database dialog box appears. Double-click the Lotus Domino server you would like to export to, and then select the database you would like to export to. After you click OK, you're given the opportunity to enter a comment. Click OK again, and the export commences.

Now, when a Lotus Domino user logs on to that database, your report appears on that desktop.

Exporting to Lotus Domino Mail

Exporting to Lotus Domino Mail starts out the same way the earlier export example start. In the Export dialog box, select Separated Values (CSV) for format and Lotus Domino Mail as destination and then click OK. The Separated Values Export Options dialog box opens. Choose a delimiter and a separator, as well as several other options, as shown in Figure 21-10.

After choosing appropriate options, click OK. You might be asked to enter a password. After doing so, the Send Mail window appears. Fill in the requested information and then click Send.
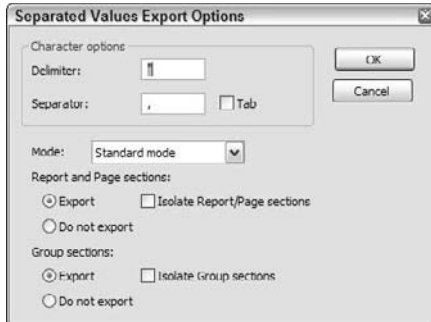
Exporting to MAPI (Microsoft Mail)

Just as you need Lotus Domino Mail installed to be able to export in that format, you must have a Microsoft mail client (such as Microsoft Outlook, Microsoft Mail, or Microsoft Exchange) installed and properly configured in order for Exporting to MAPI to work. If your setup is configured properly, specify MAPI in the Export dialog box and then click OK. The Excel Format Options dialog box appears. Make appropriate entries and then click OK. In the Send Mail dialog box that appears, fill in the address information and click Send. The export process commences, and the report is sent to the addressee.

Exporting to HTML

When you export to HTML, your report becomes readable on a standard Web browser. You can send the HTML file that you produce to any compatible destination, including a disk file. At the Export dialog box, fill in a Format of HTML 4.0 and a Destination of Disk file.

Click OK to show the Select export rile dialog box, as shown in Figure 21-11.
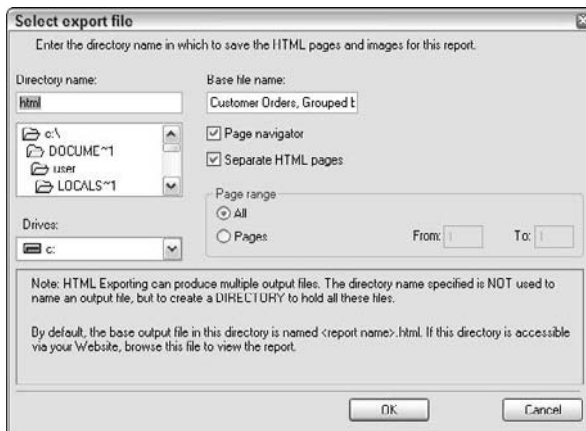
Specify the drive and directory where you want to send the file, choose a few additional options, and then click OK. The export commences.

Exporting to an ODBC data source

You can export a Crystal Report directly to any Open Database Connectivity (ODBC) data source, such as an SQL Server database. For this to work, you must have an ODBC data source set up through your ODBC administrator. After the report is in the database, it can be manipulated in a variety of ways, depending on the capabilities of the data source.

In the Export dialog box, when you specify a format of ODBC, the destination menu is grayed out. Click OK to show the ODBC Formats dialog box shown in Figure 21-12.
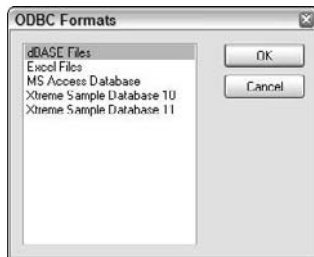
Figure 21-12:
The ODBC
Formats
dialog box.

Select the database to which the report will be added as a new table and then click OK. If the database is password protected, you are asked to enter a Logon ID and a password. After you do, the Enter ODBC Table Name dialog box appears.

Accept the default table name or give it a new one, and then click OK. Your report is exported into that database as a new table.

Exporting to an XML file

To export to an XML file, select the XML format in the Export dialog box, specify a destination, and click OK. The XML Export Options dialog box appears and asks you to choose an XML exporting format, as shown in Figure 21-13.

When you click OK, the Choose Export File dialog box appears, giving you a chance to specify a folder and a filename for the XML file. Specify both and then click the Save button. The export proceeds.

XML Export Options

Please choose an XML exporting format:

Crystal Reports XML (default)

Description
Output XML according to the built-in schema

OK   Cancel

Figure 21-13:
The XML
Export
Options
dialog box.
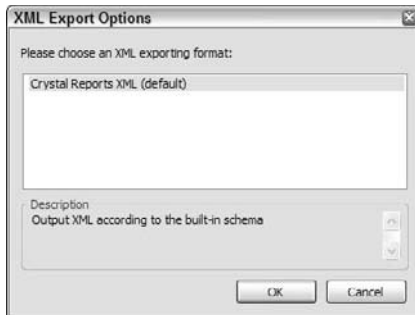
Troubleshooting Output Problems

Little can go wrong when you're attempting to print a Crystal Reports report to your system's printer. If you can print a document from your word processor or another application, you should be able to print from Crystal Reports.

- ✔ **If you can't print from any of your applications:** Check to confirm that the printer is on and properly connected to your computer. Make sure that your printer is identified as your computer's default printer.

- ✔ **If you can't fax a report:** Make sure that your fax software is properly installed. Confirm that it works when sending a document from your word processor. If your system won't send a word processor document, the fault is not with Crystal Reports. Make sure that your fax driver is identified as your computer's default printer.

- ✔ **If you have trouble exporting a report:** Make sure that you correctly specify the format and the destination. Like printing and faxing reports, exporting is pretty foolproof after you set up your connections properly.

Chapter 22

Displaying Reports Online

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*A*s organizations become more interconnected electronically, an emerging trend is to communicate more over the network than by passing around paper. In many cases, organizational intranets have become the communications medium of choice. Beyond the organization's borders, extranets and the Internet have assumed more important roles. Crystal Reports takes advantage of this trend. Report features, such as drill down and subreports, require the report reader to be online. It's not hard to drill down into a sheet of paper, but when you do, you don't see very much, and it tends to ruin the surface of your desk.

In this chapter, I discuss the various electronic means of distributing reports. The reports are distributed and accessed using a variety of tools. One of these ways, I mentioned briefly in Chapter 21, namely exporting to a static HTML page, visible on a local area network, a wide area network, or around the world on the World Wide Web. One of the really handy features of HTML is that it enables you to navigate from one page to another using hyperlinks. Here I describe how to add hyperlinks to a Crystal report. A brand new way to distribute reports is to make use of the crystalreports.com Web site hosted by Business Objects. It provides a secure repository for your reports that are always available to your authorized report viewers, as long as they have an Internet connection.

The flipside of report publishing is report viewing. Reports on crystalreports. com can be viewed with a common Web browser. Your readers can view reports that reside on a local network using the Crystal Reports Viewer. You can even attach a report to an e-mail message.

Exporting to a Static HTML Page

Web pages, whether they're designed to be viewed by a small group of people on a company intranet or by a worldwide audience on the Web, are implemented by using HyperText Markup Language (HTML). A report created in Crystal Reports can go online in several ways. Exporting to a static HTML page is the easiest but also the most limited. The only thing that gets exported is what's visible onscreen.

WARNING!

When you export a report to a static HTML page, take note of the word *static*. The data in the report is only a snapshot of the data at the time of the export. An exported report isn't updated when the data in the original report changes. To display the changed data, you have to export the report again.

For many applications, you don't need to go beyond static HTML. In those cases, exporting is as easy as 1-2-3. Well, actually, it's as easy as 1-2-3-4:

1. **Open the report that you want to export, and display the screen — the main report or subreport — that you want to present to your online audience.**

2. **Choose File➪Export. Then, from the submenu that appears, choose Export Report.**

   The Export dialog box appears.

3. **From the Format drop-down list, select HTML 4.0. From the Destination drop-down list, select Disk File. Then click OK.**

   The Select Export file dialog box appears, as shown in Figure 22-1.

Figure 22-1:
Exporting static HTML is simple.

Select export file

Enter the directory name in which to save the HTML pages and images for this report.

Directory name:
html

Base file name:
Customer Orders, Grouped t

☑ Page navigator
☑ Separate HTML pages

Page range
⊙ All
○ Pages   From: To:

Drives:
c:

Note: HTML Exporting can produce multiple output files. The directory name specified is NOT used to name an output file, but to create a DIRECTORY to hold all these files.

By default, the base output file in this directory is named <report name>.html. If this directory is accessible via your Website, browse this file to view the report.

OK   Cancel

4. Choose the drive and directory where you want to place the HTML file, make a couple of additional selections as shown in Figure 22-1, and then click OK.

An HTML version of your report is created and stored in the directory you selected. From there, you can upload it to your Web server.

WARNING!

When you export a report to another format, such as HTML 4.0, you'll likely lose some of the formatting of the original report. Crystal Reports does its best to preserve the original formatting, but the appearance of the exported report probably won't match the original exactly. If you're not happy with how the exported report looks, you might have to make changes to the original to come up with a design that is less affected by the change of file type.

Figure 22-2 shows the top of the Customer Orders, Grouped by Region (Mexico) report as it exists in Crystal Reports. Note that the title is enclosed in a box with rounded corners.

After exporting the report to HTML 4.0, it looks like Figure 22-3.

The two reports look virtually identical except that the corners of the box enclosing the title are no longer rounded.

REMEMBER

More complex formatting features, however, such as cross-tabs and OLAP grids, might not translate as well in the exported report. Judge each case individually.

After you save your report to a disk file, you can upload the file to your Web server in the same way that you upload any other files that appear on your site.

Figure 22-2: The Customer Orders, Grouped by Region (Mexico) report in Crystal Reports.
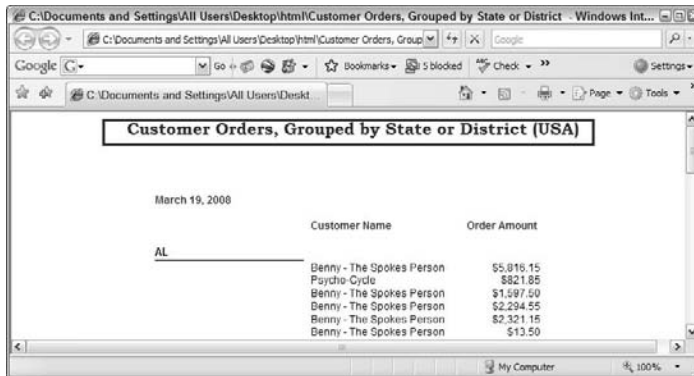
Adding a Hyperlink to a Report

One of the most valuable features of Web-based content is the capability to quickly move between pages by using hyperlinks. By clicking a hyperlink associated with a word, a phrase, or an image, a report reader can instantly display a different page that provides more detail.

Crystal Reports enables you to add hyperlinks to your reports without your having to become a HTML scripter. Here's how:

1. **In your report, select the object that you want to turn into a hyperlink and then click the Insert Hyperlink icon on the Expert Tools toolbar.**

   Alternatively, right-click the selected object and choose Format Field or Format Text.

   The Hyperlink tab of Format Editor appears, as shown in Figure 22-4. If the Hyperlink icon on the Expert Tools toolbar appears dimmed, it probably means that you have not selected an object to anchor the hyperlink.

2. **Select the type of hyperlink that you want.**

   For example, to link to a Web site, also type a Web site address in the Hyperlink Information text box.

3. **Click OK.**

The anchor object doesn't look any different, but now when you hover the cursor over your hyperlink anchor object, it turns into the familiar pointing hand, indicating that a click sends you somewhere else.

In addition to linking to a Web site, you can link to several places or even delete a link; refer to Figure 22-4. Here's a brief description of the options available:

Figure 22-4:
Add a
hyperlink
here.

✔ **No Hyperlink:** Removes a hyperlink from the selected object.

✔ **A Website on the Internet:** Links to a Web site.

✔ **Current Website Field Value:** Select this when you want to link to the URL contained as a value in the selected object. This option appears dimmed if no URL is contained as a value in the selected object.

✔ **An E-mail Address:** Enables users to send e-mail messages to a recipient that you specify. When you select this option, the Hyperlink information area changes, enabling you to enter an e-mail address.

✔ **A File:** Links to a file on the user's computer.

✔ **Current E-mail Field Value:** Select this when you want to send an e-mail message to the address contained as a value in the selected object. This option appears dimmed if no address is contained as a value in the selected object.

✔ **Report Part Drilldown:** Specifies which detail object is displayed when the user drills down on a report part. (I explain Report Parts in Chapter 20.) This type of hyperlink works only with DHTML (dynamic HTML) viewers, such as Internet Explorer 4.0 and above, and is dimmed if the source object you chose is not appropriate for drill down.

✔ **Another Report Object:** Links directly to the object that the user specifies. The destination object might be in this report or in another report.

As a typical example of how to establish all of these hyperlinks, let's link to a Web site on the Internet. Follow these steps:

1. **Open the source report and select the object that you want as the originator of the hyperlink.**

2. **Click the Insert Hyperlink icon.**

   The Hyperlink tab of Format Editor appears.

3. **In the Hyperlink Type area, select the A Website on the Internet radio button.**

4. **In the Hyperlink Information area, fill in the URL of the Web site to which you want to link.**

   Figure 22-5 shows what Format Editor looks like at this point.

5. **Click OK to establish the link.**

   When the cursor hovers over the source object, it turns into the traditional hyperlink-indicating pointer hand icon. Double-clicking the source object launches your default browser and displays the target Web site.

Figure 22-5:
The
Hyperlink
tab of
Format
Editor with
the target
Web site
address
entered.

Distributing Reports via crystalreports.com

crystalreports.com is a report storage and distribution service hosted by Business Objects. You can upload your reports to crystalreports.com, where they will be available over the Web to any users whom you designate and issue passwords. Two editions are available:

- ✔ **Starter:** Free but with limited capacity
- ✔ **Professional**: Essentially unlimited but carries a monthly charge

When you store your reports on crystalreports.com, only users that you authorize can view them.

To get started with crystalreports.com, you must first have some reports to upload and some users who you want to be able to see them. Then, do the following.

1. **In your Internet browser, go to crystalreports.com.**

   There is quite a bit here.

   - **If you're a registered user:** Click LOG IN to get started.

   - **If you're not a registered user, do the following:**

   a. *Click TRY IT FREE.*

   You're taken to the Registration page shown in Figure 22-6.

   b. *Choose between the Starter and Professional editions.*

   You can register for the Starter Edition by giving your contact information, or pop for the Professional Edition by giving the same information and then arranging for making the monthly payments.

2. **Log in.**

   You go to the crystalreports.com main page, as shown in Figure 22-7.

You can practice on some sample reports, as well as free downloads of Crystal Reports Desktop Publisher and Crystal Reports Viewer. I discuss them both later in this chapter. Crystal Reports Desktop Publisher is the tool you use to upload reports to crystalreports.com. Crystal Reports Viewer is the tool with which authorized users can view reports. It can be used by people on your local intranet or over the Internet by people anywhere in the world.
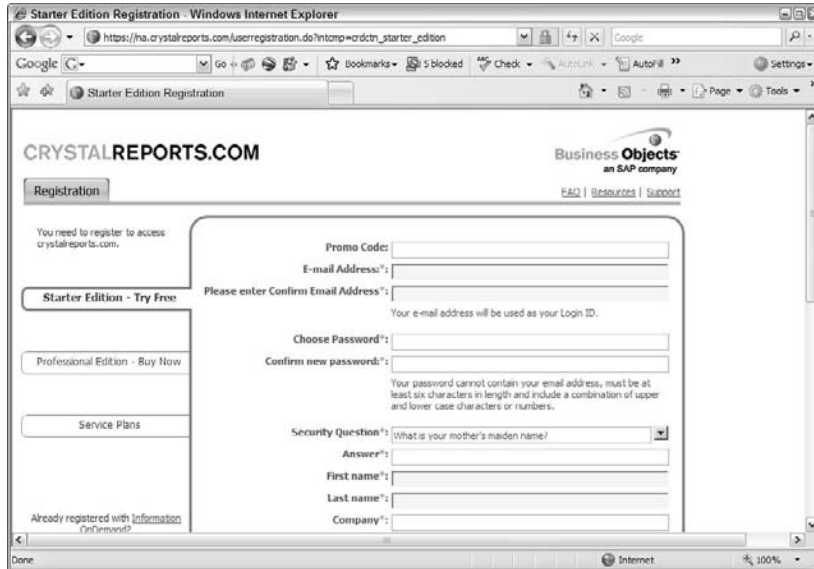
Figure 22-6:
The crystal
reports.com
Registration
page.
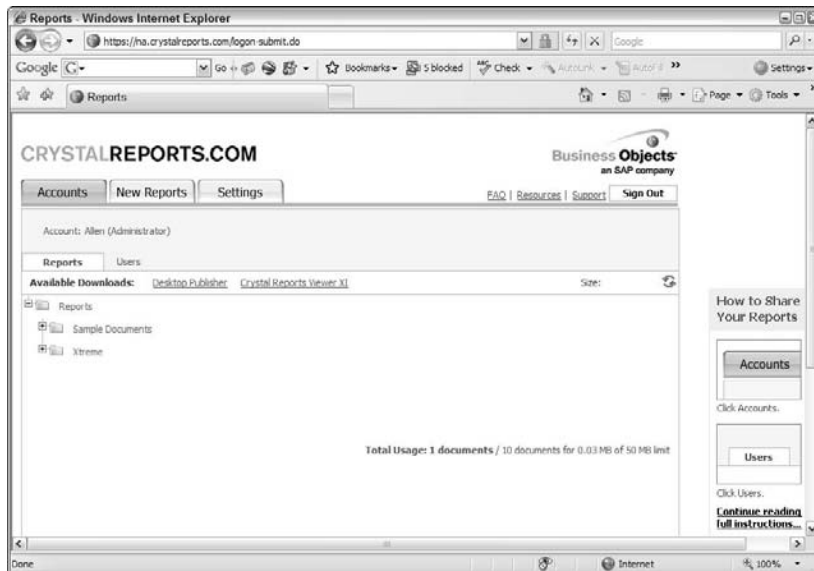
Figure 22-7:
crystal
reports.com
main page.

Integrating with salesforce.com

salesforce.com is an example of an on-demand customer relationship manage-
ment (CRM) solution that delivers strategic sales and marketing information
across organizational boundaries in large commercial organizations. crystal

reports.com can be integrated into salesforce.com, adding business analytics capability. As a result, information from salesforce.com and information from an organization's other data sources can be combined on a single screen to give executives a strategic view of company operations. Information is displayed in a manner designed for quick, easy comprehension with customized reports, dashboards, and graphical renderings. salesforce.com is just one example. Many other business intelligence products include Crystal Reports as their report writer. Reports generated in any of these environments can be hosted on crystalreports.com.

Publishing to crystalreports.com with Crystal Reports Desktop Publisher

Crystal Reports Desktop Publisher is a free utility that you can download from the Business Objects Web site. You can use it to upload to crystal reports.com the reports that you want to host there.

After you install Crystal Reports Desktop Publisher and launch it, you see the screen shown in Figure 22-8.
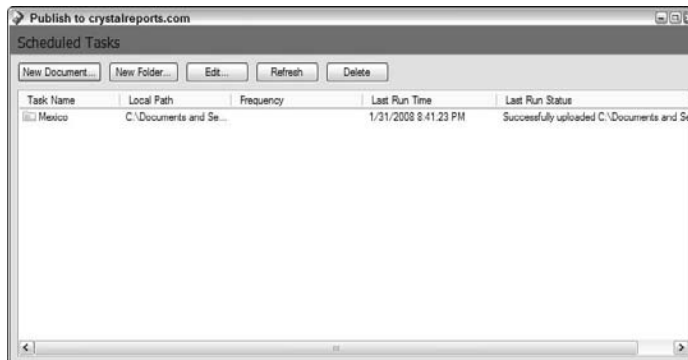
Figure 22-8:
The Crystal
Reports
Desktop
Publisher.

As an example, publish the Customer Orders by State or District (Mexico) report to crystalreports.com.

1. **Put the files you want to upload to crystalreports.com into a folder by themselves.**

   When you specify a folder to Crystal Reports Desktop Publisher, it uploads all the reports it finds in that folder.

2. **Click the New Folder button in the Desktop Publisher.**

   The Untitled Properties dialog box appears.

3. **Fill in the fields in the Untitled Properties dialog box.**

   The address of the destination server has been filled in for you.

   Specify the following:

   - The source directory of your upload folder

   - Your identifying e-mail address

   - Your crystalreports.com password

   - The folder on crystalreports.com where you want your report to go

4. **When a dialog box pops up displaying your crystalreports.com folders, specify one of them.**

   At this point, the Untitled Properties dialog box has been renamed to reflect the Task Name you entered, and should look something like Figure 22-9.

   WARNING!

   Be sure to fill in the Local Password field at the bottom of the dialog box with your logon password on your local computer. If you don't have a logon password, create one. Without such as password, Publisher cannot connect to crystalreports.com. The upcoming Figure 22-10 shows the error message you receive if you don't enter a local password into the Properties dialog box.

Figure 22-9:
Mexico
Properties
dialog box.

5. Finish in the properties window by doing one of the following:

- *Click Run Now* to upload the contents of the upload folder immediately.

- *Click the Edit button* to schedule an upload later.

WARNING!

When you use crystalreports.com, you are entrusting your valuable business information to Business Objects, an external organization. Clearly Business Objects takes its fiduciary responsibility seriously and protects your information from harm. However, technical difficulties can arise, no matter how well designed a system is. When that happens, your information might become unavailable to you, and you might see a message such as that shown in Figure 22-10.

Figure 22-10:
Message
encountered
upon
attempt to
upload a
report.

Logon failure: user account restriction. Possible reasons are blank passwords not allowed, logon hour restrictions, or a policy restriction has been enforced

OK

After a report is successfully uploaded to crystalreports.com, it's available to users whom you authorize to view it.

You can create a list of authorized users by importing a CSV file showing each user's information. You can do this from the Users tab on the crystalreports.com main page as shown in Figure 22-11. The format you must follow in the CSV file is specified by a template you can view by clicking under the Browse button.

Always have a backup

Who would have thought that a simple thing such as not having a password on your computer would stop you from uploading files? What other problems might be lurking in the shadows, waiting for a chance to emerge and stop you cold? As I write this, India and most of the Middle East have lost half of their Internet bandwidth for as long as a week because two undersea cables were cut by a ship's anchor that just happened to be dropped in the wrong place in the Mediterranean Sea. There is no telling when some unexpected event will prevent you from accessing crystalreports.com. It's wise to have a backup strategy in case your primary resource becomes unavailable.
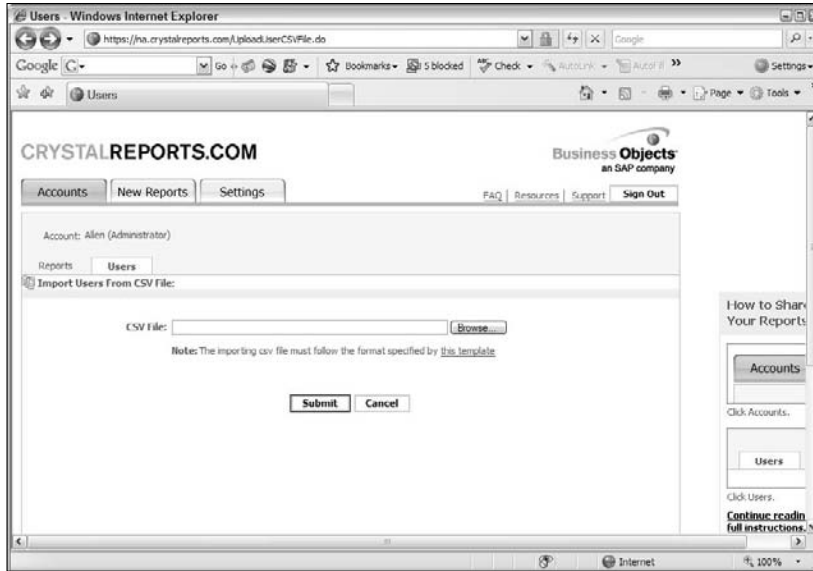
Figure 22-11:
Importing
users from
a CSV file.

Interactive Report Viewing with Crystal Reports Viewer

In order to create a Crystal report, you need to have Crystal Reports, either 2008 or one of its earlier versions. However, you don't need Crystal Reports to *view* a Crystal report. You can do that with the free Crystal Reports Viewer, which you can download from the Business Objects Web site. The Crystal Reports Viewer gives users most of the flexibility of Crystal Reports itself, but is not quite as interactive. You cannot refresh a report from the Viewer, and you cannot view reports that contain parameters. However, an organization with a small number of developers can distribute the reports they create to a large number of users very economically. When you launch the Viewer, you see something similar to Figure 22-12.

The Community panel (on the left) is your link to resources that help you get the most out of the Viewer. When you click any link there, your Internet browser takes you to the appropriate topic on the Business Objects Web site — maybe a sample report, or an article telling you how to perform a given operation. There is also a forum where you can ask questions and receive answers from other Crystal Reports Viewer users. As your familiarity with the product grows, you can switch roles and be the person who is helping rather than the person being helped.

Opening a report in Crystal Reports Viewer

You can open a report within the Viewer in several different ways. One way is the familiar one of choosing File➪Open. This works exactly the same way as it does for many popular Windows applications. A second way is to click the Open a Crystal Report icon on the toolbar just below the menu bar. The icon looks like an open file folder. A third, and even simpler method, is to just drag the report file icon from Windows Explorer into the Viewer.

Navigating a report

When you load a report into the Viewer, the Community side panel is replaced by the Contents side panel, as shown in Figure 22-13. In this case, the Contents side panel displays a map of report sections.

You can dismiss the side panel if you wish, to display the full width of the report, by clicking the X in the panel's upper-right corner. This is probably the mode that you want to operate in, as shown in Figure 22-14.

Paging through a report

You want to be able to easily move through a multi-page report page by page. The Viewer gives you this capability with the page movement icons in the middle of the toolbar, just to the left of the display of which page you are on.

Click the right-pointing arrow to move forward through the report; click the left-pointing arrow to move back toward the beginning. Figure 22-15 shows what this looks like on page 5 of a 29-page report.

Figure 22-13:
The Contents panel displays a map of report sections.

Figure 22-14:
Suppress the side panel for more real estate.

Moving directly to a specific section

To jump directly to a report section, just click that node in the tree diagram in the Contents panel, which shows all the nodes in the report; see Figure 22-16.

If the Contents side panel is suppressed, just click the Contents tab on the toolbar to redisplay it.

Figure 22-16:
Click a node
to see a
report
section.

Moving to a hidden section

Some reports have hidden sections. You can find these sections and view what is contained in them, with the help of the Contents panel. Figure 22-17 shows a report that contains hidden details.

Notice the link icon to the left of all the state nodes in the tree. The link icon indicates a hidden section at that node. Click the link icon for the node of your choice to display the detailed information that is hidden in that section. Figure 22-18 shows one example.

Figure 22-17: Report with hidden details.
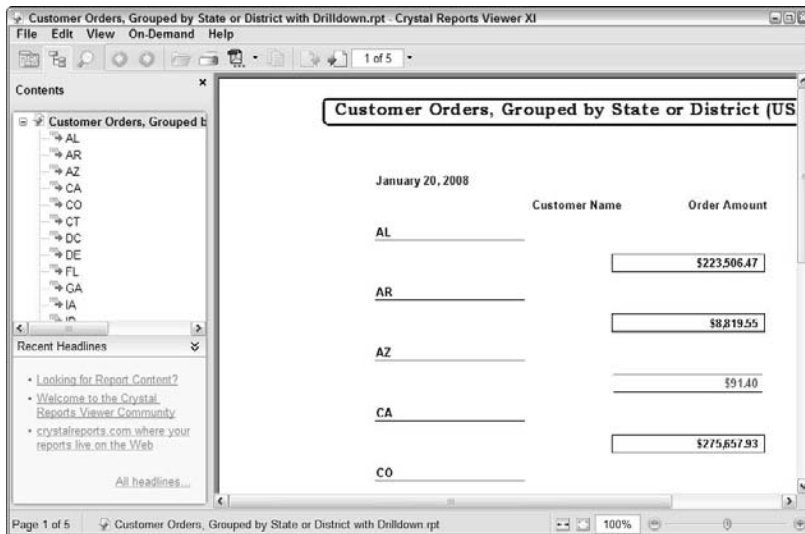
Figure 22-18: Hidden section of a report.
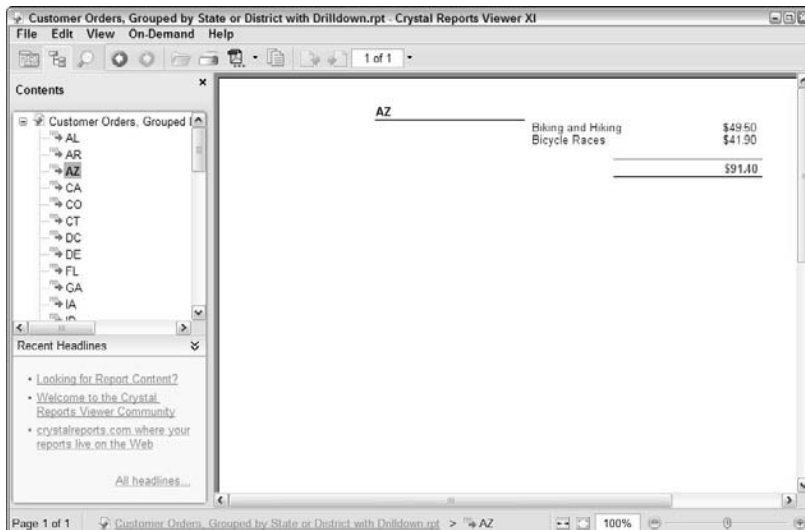
Isolating report extracts

You can do for a section that is not hidden the same thing that you can do for a hidden section: namely, select it and display it all by itself. To do this, right-click the group heading for the group you want to isolate. A contextual menu displays, as shown in Figure 22-19.
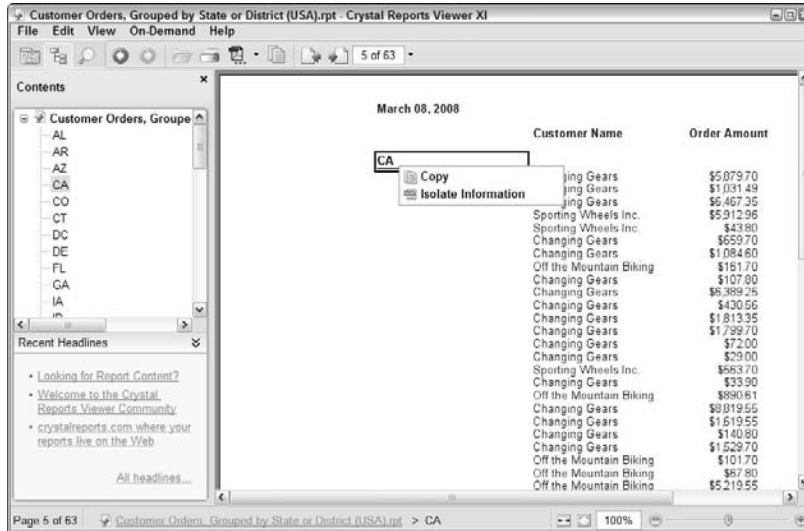
Figure 22-19: Extracting a section from a report.

Choose Isolate Information from the menu. The section you choose is displayed, unadorned by headers and footers, and unaccompanied by any other sections.

Resizing the report to fit the Viewer

In the lower right of the Viewer is a zoom slider that you can use to change the size of the report. The default size is set to 100, but you can make it bigger or smaller as shown in Figure 22-20.

To the left of the slider are the Fit Page and Fit Width icons. Clicking the Fit Page icon resizes the report page to fit entirely within the viewer. Clicking the Fit Width icon resizes it to fill the viewer horizontally, but not necessarily vertically.

Printing a report

Printing a report from the Crystal Reports Viewer is much like printing from any Windows application. You can choose from two options: Print Current Section and Print All (Include Hidden Sections). Select whichever of these gives you what you want.
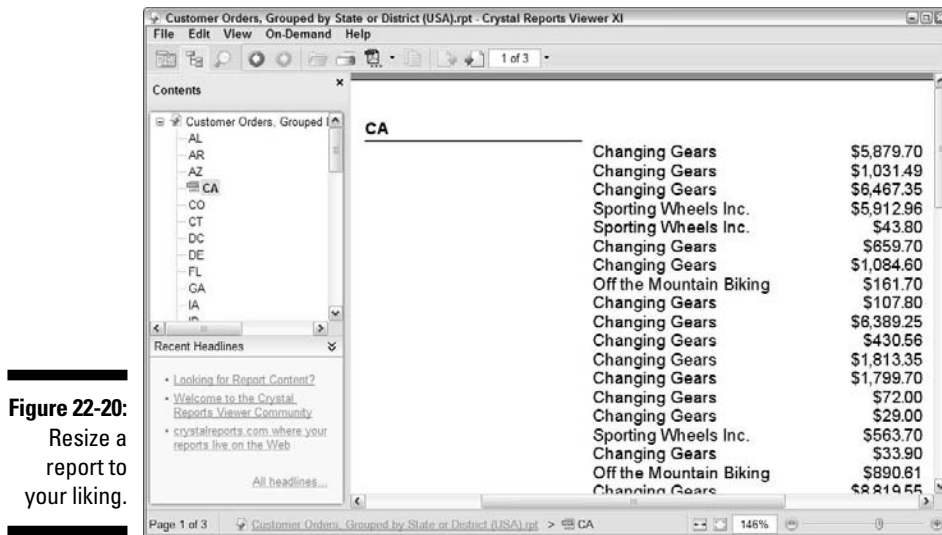
Figure 22-20:
Resize a
report to
your liking.

E-mailing reports to your friends and co-workers

E-mailing a report is easy. To attach your report to an e-mail, just choose File↪ Attach to Email. Your e-mail client launches, with your report as an attachment. All you have to do is type the e-mail address of the person you want to send the report to, along with whatever message you want to include. Send the e-mail like you normally would send any e-mail, and your report is on its way.

Sharing reports in a variety of formats

From Crystal Reports Viewer, you can export a report in Microsoft Excel, Microsoft Word, or Adobe Reader format. Here's how:

1. **Choose File↪Export Current Section.**

2. **Select one of the three available formats.**

3. **Select the directory you want to export to.**

4. **Verify the report name and export file type.**

5. **Click Save.**

The report is exported in the specified format to the selected directory on your system.

Searching a haystack for that elusive needle

To search for a word of phrase buried somewhere in a report, click the Search tab to display the Search side panel. Enter the search term or phrase and then click the Search button, as shown in Figure 22-21.

The Viewer scans the report and then displays the page number of each page upon which the target word or phrase appears.

Accessing reports on crystalreports.com

The cool thing about having your reports available on crystalreports.com is that any authorized user with an Internet connection can access them, using nothing more than an ordinary browser. Users don't need Crystal Reports or Crystal Reports Viewer. A report accessed from crystalreports.com using a browser looks something like Figure 22-22.

Figure 22-21:
Search for
a word or
phrase in
the report.
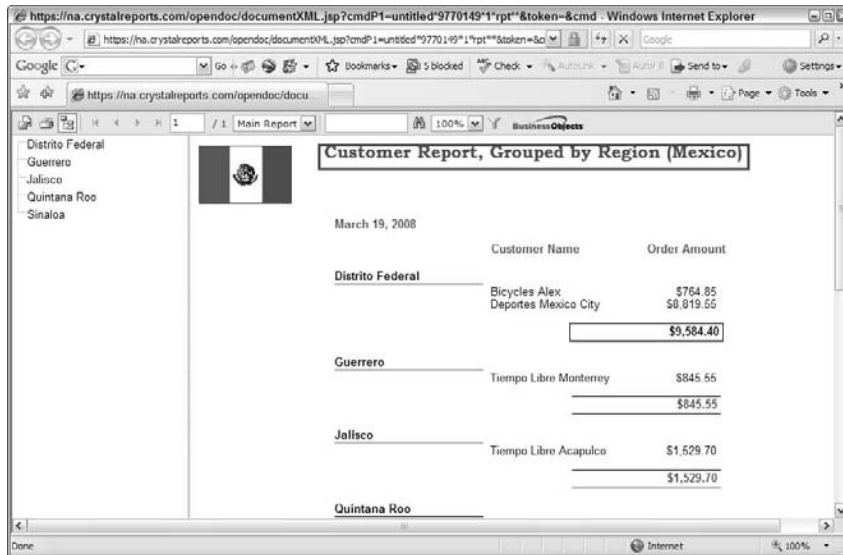
Figure 22-22:
Report
residing
on crystal
reports.com.

Chapter 23

SQL Expression Fields

*C*rystal Reports 2008 has a feature called SQL Commands. SQL is an internationally accepted standard language for dealing with relational databases. Report writers, such as Crystal Reports, retrieve data from such databases. They do so by translating the data retrieval part of the report into an SQL statement that's sent to the database. The database management system (DBMS) executes the SQL statement on the data in the database, and then sends the result set back to the report writer, which formats and displays it.

As you may know, some concepts that you can express in one language are impossible to translate accurately into another language. I ran into this problem while trying to communicate with a taxi driver in Beijing, China, using my community college Mandarin. I ended up on the wrong side of town, late at night. A similar problem can happen with database reports.

Even though Crystal Reports provides handy wizards and dialog boxes, you might have a hard time zeroing in on a particular data set. You might, however, be able to get what you want by speaking the database's native language, SQL. SQL isn't a particularly easy language to learn. (***Hint:** SQL For Dummies* [Wiley], by yours truly, can make it about as easy as possible.) If you make the effort to learn SQL, you can extend the power of Crystal Reports. And when using the SQL Commands feature of Crystal Reports, you can add anything you want to your report. If the information you want is buried somewhere in your database, you can retrieve it with SQL.

Creating an SQL Statement

To create an SQL statement, you must start with a report. Here are the steps for adding an SQL statement to one of the reports that you created in an earlier chapter.

1. **With the Xtreme sample database connected, open the Customer Orders, Grouped by State or District (USA) report.**

2. **On the Expert Tools toolbar, click the Database Expert icon, or choose Database⇨Database Expert.**

   The Database Expert dialog box appears, as shown in Figure 23-1. The Xtreme sample database should be displayed in the Selected Tables pane, with the Customer and Orders tables listed under it. In the Available Data Sources pane, Add Command should be visible below the connection to your database.

3. **Double-click the Add Command node.**

   The Add Command to Report dialog box appears, as shown in Figure 23-2.
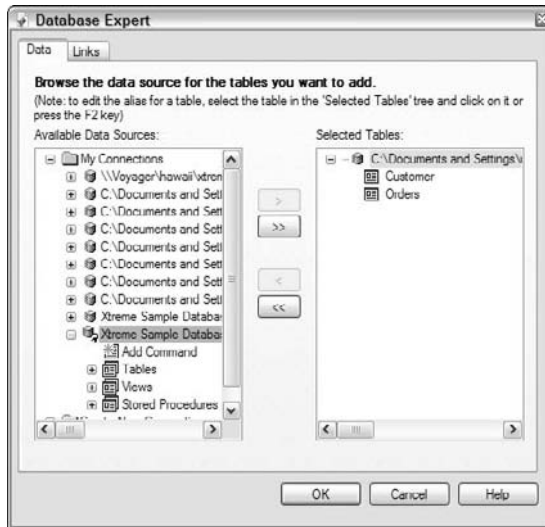
Figure 23-1: Start in Database Expert.
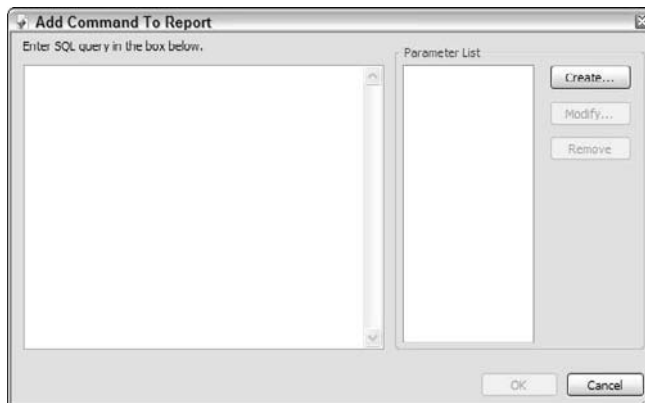
Figure 23-2: Add the SQL statement here.

4. **Type the following SQL statement in the left pane:**

```
SELECT
     Customer.[Customer ID],
     Customer.[Customer Name],
     Customer.[Last Year's Sales],
     Customer.Region,
     Customer.Country,
     Orders.[Order Amount],
     Orders.[Customer ID],
     Orders.[Order Date]
FROM
     Customer Customer INNER JOIN Orders Orders ON
          Customer.[Customer ID] = Orders.[Customer
       ID]
WHERE
     (Customer.Country = "USA" OR
     Customer.Country = "Canada") AND
     Customer.[Last Year's Sales] < 10000.
ORDER BY
     Customer.Country ASC,
     Customer.Region ASC
```

Figure 23-3 shows the Add Command to Report dialog box after the SQL command has been entered.
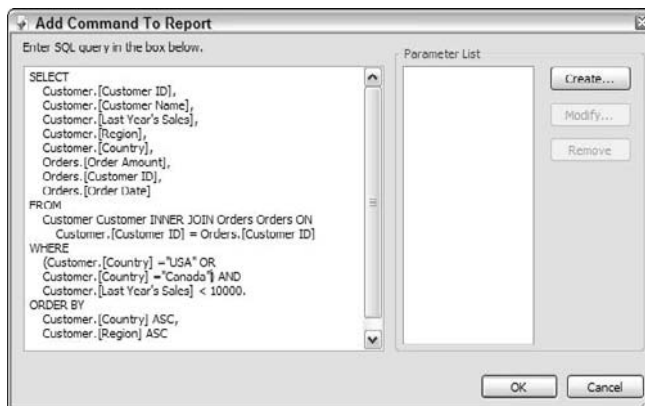
This rather lengthy SQL statement retrieves selected information from the Customer and the Orders tables on all customers in either the USA or Canada that had sales last year of less than $10,000. The records returned are sorted first by country (Canada first, then USA) and then by region (province or state).

The specific database driver that your system uses might differ from the driver that my system uses. For example, my system accepts square brackets around field names that contain blanks or other punctuation, whereas yours might accept single or double quotes instead. If your

system has Access, look at the syntax of the SQL that it generates, and use the same thing. It's important that Crystal Reports can distinguish between field names and quoted strings such as `"USA"`. It also needs to be able to properly handle field names that include punctuation, such as `Last Year's Sales`.

5. **Click OK.**

   You return to Database Expert.

6. **Click OK.**

   Database Expert displays Link view.

7. **Click OK.**

   In my case, a Database Warning dialog box appears, stating

   ```
   More than one database driver has been used in this
       report. If you want to change the database
       drivers use Database/Set Location.

   Please make sure that no SQL Expression is added and
       no server-side group-by is performed.
   ```

   You can safely ignore this announcement. You might see more dialog boxes. Click through them until you get to the Refresh Report Data dialog box.

8. **Click OK.**

   When all the dialog boxes go away, Report Designer displays your report. Field Explorer has a new table named Command. Crystal Reports has saved your query as a database table named Command. You can change the name if you want.

Modifying an SQL Statement

Modifying an SQL command is similar to creating one. Here are the steps:

1. **In the Selected Tables pane of Database Expert, find the statement that you want to edit.**

2. **Right-click the statement and choose Edit Command.**

   The Modify Command dialog box appears, as shown in Figure 23-4. The existing statement appears in the left pane, although its appearance may vary from one implementation to another.

3. **Make whatever changes to the statement that you want.**

4. **Click OK to execute the change, and then click OK again in Database Expert.**

   You see Link view.
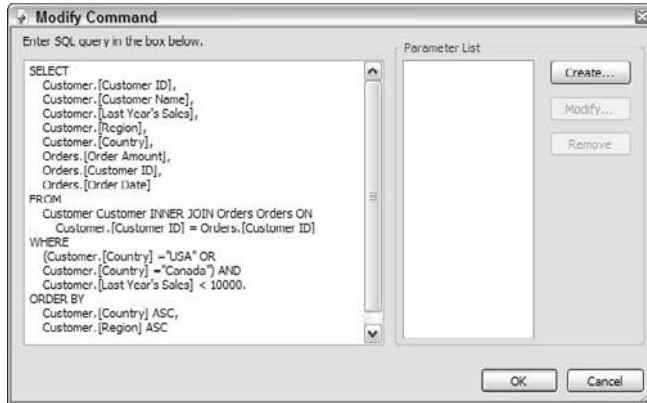
Figure 23-4:
The Modify
Command
dialog box.

5. **Click OK.**

6. **When the Database Warning dialog box appears, click OK.**

7. **Click OK in the Refresh Report Data dialog box.**

    The revised SQL statement appears in Field Explorer under Database
    Fields. If you select any of the fields under the statement and then click
    the Field Explorer Browse button, a browse dialog box appears, display-
    ing all the data that the report retrieved from that field. Figure 23-5
    shows the result of browsing the statement's Customer Name field.

Figure 23-5:
The new SQL
statement
returns the
data in the
Customer
Name field.

Modifying SQL statements that you create is a valuable capability. However
the real value of the SQL modification feature is in modifying the SQL that
Crystal Reports creates. When you create a report that displays data from
some data source, Crystal Reports creates an SQL statement to retrieve the
information you want from that source. It does its best, but may not neces-
sarily retrieve the information in the optimal way. In many cases it is possible
to considerably increase performance by fine-tuning the SQL that Crystal
Reports creates.

Part VI
The Part of Tens

In this part . . .

This Part of Tens distills information found in various places throughout the book into lists of ten pithy pointers for creating better reports. I recommend reading Chapter 24 before you start each new report generation project and also reading Chapter 25 when you're wrapping up a project. These guidelines will help you remember something that you could do to improve your report.

Chapter 24

Ten Things to Do Before You Create a Report

In This Chapter

▶ Identifying and interviewing your users

▶ Setting the report's appearance, including graphics

▶ Arbitrating conflicting demands

▶ Nailing down the project's scope and schedule

▶ Verifying necessary data in the database

▶ Determining how the report will be viewed

▶ Determining the best report type for the users' needs

With a great report-writing tool such as Crystal Reports, you might reasonably assume that creating a report is an easy task that doesn't require much thought or effort. That would be a bad assumption. Creating a high-quality report that truly meets users' needs requires considerable thought and effort even before you fire up Crystal Reports for the first time. You should put thought and effort into at least these ten things before you apply fingers to keyboard.

Identify the Users

Identifying the users might seem obvious, but it's not as obvious as you might think. Sure, the person who asked you to create the report is probably someone who will use the report. But who else will benefit from using this report? Other people in your client's workgroup? Your client's manager? People in other workgroups or other departments? Perhaps even people in other companies? Identifying *all* the probable users is important.

Interview the Users

After you identify all the people who could benefit from your report, find out what they need the report to tell them. What information should the report contain? How should the information be presented? The only way to get the complete answer is to interview at least one representative of each class of user. However, interviewing them all is best. After all, what's unimportant to one class of users might be vital to another.

Get Agreement on the Report's Appearance

Users usually have strong preferences as to how they want information presented. Their idea of the ideal presentation might differ from what makes the most sense to you. Make sure you develop a report that clearly presents information that's of interest to all the user communities. You might need to create prototypes and hold meetings with all concerned parties as well as negotiate with various user groups. Make sure that everyone will support the report's user interface before you put effort into developing it.

Arbitrate Conflicting Demands

When you have a diverse user community, almost certainly the needs of one group or individual will conflict with the needs of another. For example, one group might want the information presented in one format, while a second group insists on receiving the information in a different format. Someone has to find a compromise that's acceptable to all parties. As a neutral outside party, this arbitrator often turns out to be you.

Nail Down the Project Scope

After everyone agrees on what they want, get agreement on exactly what will be included in the project. To make sure that the project doesn't keep expanding as you go along, get a signed agreement from the client on the project's scope. This agreement protects both the developer and the client. From the beginning, everyone knows what will be delivered.

Nail Down the Project Schedule

After you know the project's scope, estimate how long it will take you to complete the project. Make sure you plan for adequate time to do a good job. If the schedule is agreed to in advance, you have a solid defense against clients who want you to speed up development so that they can have reports sooner. Quality generally suffers when a reasonable schedule is accelerated.

Verify That the Necessary Data Is in the Database

If you're going to build a report based on data in a database, it helps if the data you need is actually in the database. Sometimes clients ask for a report that their database can't support because the data just isn't there. You need to verify with a database query that the data you need is indeed present.

Determine How the Report Will Be Viewed

Because you can view a report created in Crystal Reports in several ways, start by determining the primary way your user community will view it. Will users view it on a computer that's connected to the database that the report is based on? If so, they can refresh the data to get up-to-the-minute reports. They can also drill down for detail and view the report, including charts and maps, in color.

If users will be looking primarily at printed reports, they obviously can't drill down. Remember that the data in a report is but a snapshot of the data when the report was printed, so it might not be up to date. Furthermore, if your report is printed in black and white, color obviously won't show up.

Design your report with your users in mind and optimize the report for the best viewing.

Determine the Best Report Type for the Users' Needs

Perhaps the best way to present your client's data is a standard report or a cross-tab report. Or, maybe an OLAP report. Based on the underlying data and how users want it to be presented, choose the most appropriate report type and then build the report based on that type.

Decide Whether to Include Charts or Maps

Some types of reports can be immeasurably enhanced by the inclusion of appropriate charts or maps. Charts present the data in a way that goes directly to the viewer's brain. Sometimes, columns of numbers just don't have the same effect. In those cases, adding charts or maps can be a good idea. In other cases, using a chart won't add to an understanding of the data — and might actually obscure it. Evaluate each case individually to decide whether charts or maps are appropriate.

Chapter 25

Ten Ways to Give Your Reports More Pizzazz

*Y*ou say you want to make your reports more visually appealing? Crystal Reports can help you do that. In this chapter, I mention ten simple ways to help you lift your reports out of the category of ordinary into the rarified atmosphere of truly extraordinary. You can give your reports maximum impact by tastefully combining several of the techniques in this chapter.

Use the Correct Fonts

Beyond the bare facts presented in a report, you might also want your report to convey a feeling or emotion. Perhaps you want the report to put the reader in a sober, strictly business frame of mind. Or you might want the report to playfully remind readers of things that are fun. You might want to call particular attention to certain parts of the report, while burying other parts in a way that makes them easy to overlook. You can accomplish much of this with a judicious choice of fonts.

A wide variety of font styles are available, and you can use several in the same report although you should try to avoid going overboard with too many font styles. Three different styles are usually plenty. You can also vary the size of the font, and whether it is bold, italic, or underlined. By combining all these options, you can have your report project an image that enhances what the bare words and numbers in the report have to say. It's also a good idea to use the most common fonts. The people reading your reports on their computers may not have all the fonts available that you have on your development machine.

Use Color Tastefully

Reports that are meant to be viewed on a computer screen can make use of a full palette of color. So can reports that will be printed on a color printer. Color capability makes it feasible to incorporate charts, maps, and graphical images in your reports. You can use color to emphasize text elements or to set off drawing elements, such as lines and boxes. You can even give different sections their own unique background colors.

Use your imagination to think of ways to use color to enhance your reports. Remember, however, to not overuse color effects. Make sure that any color effects are appropriate to the material and what you're trying to communicate. Don't use multiple colors just because you can.

Enclose Text in Boxes

One way to make titles and important areas of text stand out is to enclose them in boxes. Crystal Reports makes it easy to enclose text in a box. You can give the box sharp or rounded corners, and you can give it any color available on your palette. Boxes are a good way to call attention to text.

Emphasize Boxes with Drop Shadows

You can give a box (as described in the preceding section) even more emphasis by giving it a drop shadow. A drop shadow makes the box appear to come out of the page in a 3-D effect. To get a drop shadow, just right-click the box and choose Format Box. In the Format Editor dialog box that appears, select the Drop Shadow option. When you click OK, the drop shadow appears on your box.

The drop shadow feature is available only with rectangular boxes. If you round the corners of your box, the drop shadow feature is unavailable.

Produce a Consistent Appearance with Templates

You can determine many of the formatting details of a report with a template. Using a template also helps you to maintain consistency from one report to the next. For example, you can have one template for one type of report and another template for another type. Readers will become accustomed to seeing information presented in a consistent way from one report to the next.

Add an Image

An old bromide says that a picture is worth a thousand words. Sometimes that's true, and sometimes it's not. When a picture can help you get your point across, use it. Crystal Reports makes it easy to insert graphical images into your reports wherever you want them. You can use this capability for corporate logos, photographs, drawings, or images of any kind.

Add a Chart

Numeric data presented in tabular form conveys the facts but often doesn't clearly show trends or relationships among data items. Charts, whether they are line charts, bar charts, pie charts, or some other kind, can show trends and relationships clearly. When trends or relationships in data are important, by all means use a chart to bring out that point and hammer it home.

Add a Map

For some kinds of reports, it's important to show readers where things are. If your data has anything to do with geographical locations, such as sales territories or political boundaries, the Crystal Reports mapping facility can make your report much more valuable. Maps cover the entire globe, showing countries as well as individual states and provinces.

Combine Two Objects with an Underlay

You can give your report a watermark effect by underlaying words or symbols in a light font beneath the main text of your report. You can also use this facility to position a chart or map next to the text that it refers to rather than above or below it. For example, with an underlay, you might line up a chart with the detail section that contains the data from which the chart is drawn.

Separate the Summary from the Details with Drill Down

The drill-down facility in Crystal Reports makes use of the fact that more and more people view reports on their computer screens rather than read them on paper. Drill-down capability allows viewers to interact with the report, viewing detail when they want to see it and skimming past it when they don't. A person can quickly get the gist of what they want from the report and then move on to make decisions based on what they've learned.

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