CRYSTAL REPORTS® 2008

OFFICIAL GUIDE

NEIL FITZGERALD, BOB COATES,
RYAN GOODMAN , MICHAEL VOLOSHKO

Business Objects
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Press

CRYSTAL REPORTS® 2008

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"In this guide, you'll find everything from the basics to get you started on your first report, to using even the most advanced features. Listen to these experts – they will show you how to create any type of report you may need."

—James Thomas, Vice President, Product Management,
Volume Products, Business Objects,
an SAP company

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Contents at a Glance

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Neil FitzGerald is an entrepreneur who has successfully started or contributed to multiple consulting companies in the IT consulting domain. Neil combined his bachelor's degree in computer science from Queen's University in Kingston, Canada and his MBA from the Ivey School of Business at the University of Western Ontario with his more than 8 years of experience at Business Objects in a variety of senior roles to help provide information solutions to Fortune 500 companies across North America. He has spent more than 13 years in the information delivery domain and is available for onsite or remote consulting to companies large and small. Neil can be contacted at neil_fitzgerald@hotmail.com.

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Ryan Goodman is the founder of Centigon Solutions Inc. As a previous technical evangelist and sales consultant at Infommersion and then Business Objects, Ryan has implemented hundreds of Xcelsius projects spanning more than 4 years. His interactive data visualization and design background coupled with his business insight and technical aptitude have made him one of the top Xcelsius experts in the world. Ryan continues to push the envelope and evangelize Xcelsius on his blog: www.ryangoodman.net/blog.

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Dedication

To my growing family, including my daughter Maya and her expecting mom, Arlene.

—Neil FitzGerald

Dedicated to my wife Amanda for all of her love and support.

—Bob Coates

To my mentors and counterparts who have contributed to my growth, both as a professional and as a person.

—Ryan Goodman

To all the people throughout the years who have inspired me to continue achieving and advancing in life.

—Michael Voloshko

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Michael Voloshko—I would like to thank Neil for giving me the opportunity to contribute to this book and the rest of the team at Business Objects for all the hard work that goes into creating great products.

We Want to Hear from You!

As the reader of this book, *you* are our most important critic and commentator. We value your opinion and want to know what we're doing right, what we could do better, what areas you'd like to see us publish in, and any other words of wisdom you're willing to pass our way.

You can email or write me directly to let me know what you did or didn't like about this book—as well as what we can do to make our books stronger.

Please note that I cannot help you with technical problems related to the topic of this book, and that due to the high volume of mail I receive, I might not be able to reply to every message.

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INTRODUCTION

In this chapter

INTRODUCTION TO INFORMATION DELIVERY

Organizations of all sizes today find themselves increasingly awash in data, yet hungering for information to help them meet their business objectives. These corporations, from Main Street and Wall Street alike, have spent large amounts of time and money over the past 10 or so years implementing systems to help collect data on and streamline their operations. From monolithic Enterprise Resource Planning (ERP) systems (SAP, PeopleSoft, Oracle Financials, and so on) through Customer Relationship Management (CRM) systems (Siebel, Rightnow.com, Salesforce.com, and so on) to Custom Data Warehousing projects, these firms are now looking for ways to extract value from the collective body of data to help them run their businesses more productively and competitively. These firms are looking for a strategic information delivery or business intelligence solution to help them become more productive and ultimately compete more effectively. The products covered in this book are geared toward meeting that challenge.

The information delivery products and solutions presented in this book are often categorized under the *Business Intelligence (BI)* banner. BI is the industry of value-added information delivery based on structured data sources—essentially providing meaningful, business-driven value and information to business end users by connecting them to data with appropriate tools and products. Figure I.1 highlights the conceptual divide of information delivery solutions into the structured and unstructured world. Although evidence suggests an eventual blurring of the boundaries between these discrete industries over time, the Business Objects products covered in this book most aptly fit under the BI banner.

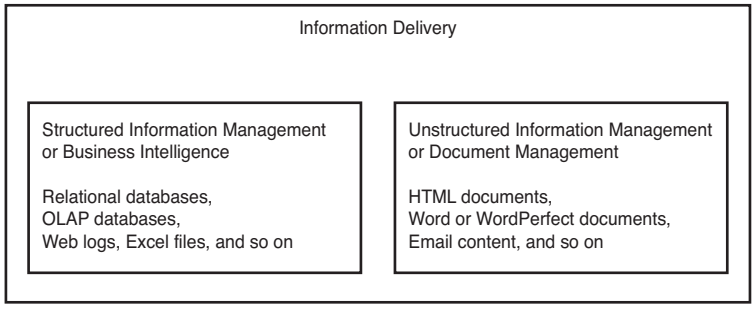


Figure I.1
The information delivery industry divides broadly into structured and unstructured information management.

Industry analysts in the information delivery area regularly highlight the impressive adoption rates of BI products in the past few years as testimony to their value. The dynamic double-digit percentage growth rates for industry leaders such as Business Objects are especially impressive when the difficult macroeconomic operating environment of recent years is taken into account. Ironically, many suggest, this same poor economic environment has largely driven the increased worldwide demand for BI functionality as firms work to increase their productivity and competitiveness by leveraging existing investments—and doing more with less. The next section covers the BI industry driver along with a few others.

Spectrum of Business Objects Product Usage

BI products such as those distributed by Business Objects (Crystal Reports, Crystal Reports Server, BusinessObjects Enterprise, Crystal Xcelsius, and Web Intelligence) are deployed and used in about as many different ways as there are product implementations—and there are millions. However, as you examine a broad swath of BI clients and their implementations, you can find definite themes to their deployments. Taking a step back, distinctive drivers to worldwide BI product adoption become evident. The following sections discuss a few of the most common.

Custom Information Delivery Applications

Despite the increasing functionality of turnkey software and web applications available today, corporations of all sizes still regularly look to custom-developed applications to provide them with unique competitive advantage and to meet their proprietary business requirements. These applications run the gamut in size from small business applications through large departmental applications to enterprise intranet and extranet applications. The key component of these custom projects is the integration of BI functionality, such as formatted reporting, ad hoc query, dashboarding, self-service web reporting, and/or analytic capabilities, within an internally developed application. Table I.1 highlights some typical examples of custom applications using the Business Objects suite of products to help deliver custom applications.

Table I.1 Sample Custom Information Delivery Applications

Application	Application Audience	Product Usage
Small retail chain's internal Java-based sales metrics application	Approximately 20 sales employees and managers	Using Crystal Reports Java Engine, the developer provides the sales team with Web access to on-demand metrics reports built into the intranet application.
Large portfolio	10,000+ high value customers of firm	Using Crystal Xcelsius and Crystal Reports Server, the management firm's developer provides access to the scalable client extranet application reporting infrastructure and facilitates those customers getting online web access to their portfolio reports.
Asset management firm's report batch of institution scheduling application	50,000+ clients	Using the Business Objects reporting server and scheduling engine, the developer's application dynamically creates tens of thousands of customized reports daily and automatically emails them to the appropriate clients in PDF and XLS formats.

A key strength of the Business Objects suite of products is that it lends itself readily to integration into custom applications. From the inclusion of basic formatted reports within Java/J2EE or .NET applications through the inclusion of rich ad hoc query and self-service reporting functionality in proprietary information product applications to provision of large-scale enterprise BI analytics, scheduling, and security functionality in a globally deployed application, the Business Objects suite of products can meet your requirements. Table I.2 provides a jump-point for those looking for each type of application integration covered in this book.

TABLE I.2 CUSTOM APPLICATION CHAPTERS OVERVIEW

Development Environment	Required Functionality	Part or Chapters
Java/J2EE	Prebuilt reports included in custom Java application	Part IV, Chapter 18
.NET	Prebuilt reports included in custom .NET application	Part IV, Chapter 19

ENTERPRISE BI INITIATIVES

With the proliferation of BI tools and the acceleration of product adoption around the globe, there has been concurrent pressure for the involved companies to standardize on a single set of products and tools—effectively a BI infrastructure or platform. The main arguments for such standardization include the following:

- Reduced total cost of product ownership
- Creation of enterprise centers of excellence
- Reduced vendor relationships
- Movement toward a BI infrastructure/platform

As BI products have matured from different areas of historical strength and their marketplace acceptance has grown, end user organizations have found themselves with disparate and incompatible BI tools and products across or even within the same departments in their organization. To eliminate the costliness of managing such a broad set of tools, many firms are now moving to adopt a single BI platform such as BusinessObjects Enterprise (or Crystal Reports Server for smaller businesses).

The infrastructure of BusinessObjects Enterprise provides a single architecture to manage all the content and tools required to serve an organization's structured information delivery requirements. Figure I.2 shows an end user map of a typical organization. To be productive, each type of end user in a company requires different types of tools. There are clear organizational benefits to a common infrastructure or centrally managed center of excellence, such as BusinessObjects Enterprise, which can meet the various end user and IT requirements.

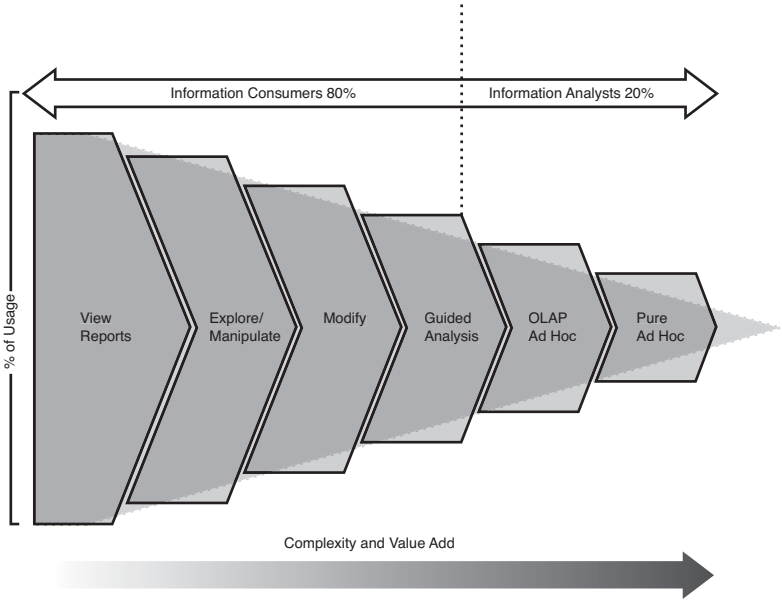


Figure I.2
Organizational end user requirements map from Business Objects.

Details of the breakdown of this book are included later in this Introduction, but to jump-start your learning on this type of BI application, Table I.3 can point you to the sections and chapters of particular relevance.

Table I.3 Enterprise Business Intelligence Chapter Overview

Enterprise Business Intelligence Focus	Chapter
Out-of-the-box product using Crystal Reports Server for small- and medium-sized businesses	Part IV, Chapter 17
Using crystalreports.com to distribute reporting content	Part IV, Chapter 17

Spectrum of BI Tool Users

Across the usage profiles of the thousands of BI scenarios/implementations, there generally exists a consistency in the types of people who become involved. Figure I.3 provides a relatively high level yet accurate graphic that shows a typical distribution of the people involved in BI implementations.

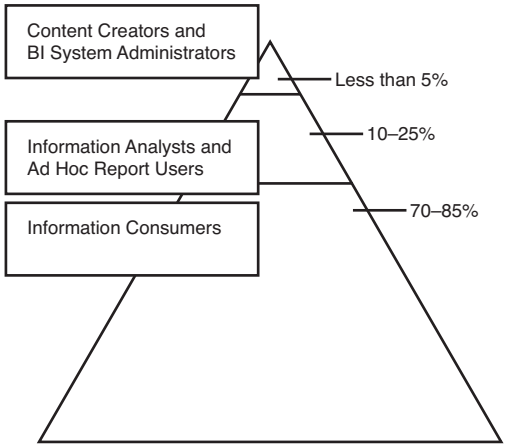


Figure I.3
Average BI implementation user distribution.

Each of the three communities outlined in the pyramid plays a key role in the ongoing success and operation of any BI implementation. The content creators and system administrators play perhaps the most important role in ensuring the short- and long-term success of any deployment because their work sets up the system content and tools from which the other users derive benefit. The information analysts generally come from across an organization's typical functions and are highly demanding users who require rich and highly functional interactive tools to facilitate their jobs as analysts. The last group is by far the largest group and includes employees, partners, customers, and suppliers who rely on the BI implementation to provide timely, secure, and reliable information or corporate truths. This group tends to span the entire corporate ladder from foot soldiers right up to the executive suite—all of whom have the same requirement of simple information provision to enable them to complete their regular day-to-day assignments successfully.

Figure I.4 provides a schematic highlighting the distinction between the different content creation tools and the content delivery tools—BusinessObjects Enterprise, Crystal Reports Server, or Java/.NET reporting engines. This book breaks down into two sections covering these two themes: content creation (Chapters 1–16) and content delivery in all of its possible forms (Chapters 17–21) using some of the Business Objects suite of products.

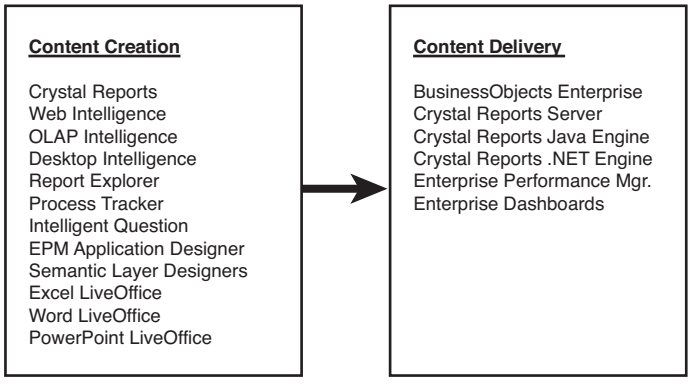


Figure I.4
Content creation and content delivery schematic.

Content Creators (Information Designers)

Content creators provide the foundation to any BI implementation. This group uses content creation tools such as Crystal Reports, Crystal Xcelsius, Web Intelligence, Desktop Intelligence (formerly BusinessObjects), Excel, and so on. These users—primarily composed of IT folks but sometimes complemented with technically savvy business users—create the report content, dashboards, OLAP cubes, and reporting metadata that facilitates system usage and benefits derived from the other system users. Because these tasks are of paramount importance in an enterprise suite deployment, the entire first half of the book is dedicated to providing these folks with a comprehensive tutorial and reference on content creation using Crystal Reports and Crystal Xcelsius.

After content exists, it is ready for distribution through an infrastructure such as BusinessObjects Enterprise, the new Crystal Reports Server product, or a custom application. Finally, the content requires management. Another small but critical group of BI system users—the BI administrators—need to ensure that the system is deployed and tuned correctly to ensure optimal performance for the business end users.

Information Analysts

Although not the primary group in number, the information analysts in a BI deployment are those who are primarily responsible for the extraction of new business insights and actionable recommendations derived from the BI implementation. Using such analytic tools as Web Intelligence, Crystal Xcelsius, and Excel, these users spend their time interrogating, massaging, and slicing and dicing the data provided in the various back-end systems until they glean nuggets of business relevance. These users tend to come from a wide variety of functional areas in a company, including operations, finance, sales, HR, and marketing and all work with the provided BI tools to extract new information out of the existing corporate data set. Chapters 20 and 21 provide detailed information on using Crystal Xcelsius, and www.usingcrystal.com provides information on Web Intelligence and Microsoft Live Office plug-ins.

Information Consumers

This group of users composes the clear majority of those involved with a BI implementation. They are also the most diverse group and come from every rung on the corporate ladder. Executives who view corporate performance dashboards fit into this category, as would truck drivers who receive their daily mileage and shipping reports online through a wireless device. The common characteristic of members of this group is that their interactions with the BI system are not indicative of their primary jobs. Unlike the content creators and information analysts, information consumers have jobs outside of the BI implementation, and the key measure of success for them is that the BI system helps facilitate their variety of assignments. Chapter 17 provides an introduction to the out-of-the-box Crystal Reports Server interfaces.

THE PRODUCT FAMILY FROM BUSINESS OBJECTS

As Figure I.4 showed, the product family distributed by Business Objects is broken into two major segments: content creation and content delivery. This book is roughly split in two, with each section covering one of the topics in great detail. The primary products in the family covered in these sections are Crystal Reports (first section) and Crystal Reports Server, the Crystal Reports SDKs, and Crystal Xcelsius (second section). The content creation section of the book introduces Crystal Reports version 2008—the world standard for professional formatted reporting across the largest spectrum of data sources. The Crystal Reports Application Designer benefits from more than 15 years of development and provides an unparalleled combination of powerful functionality and report-design flexibility.

The content delivery half of the book covers the following Crystal Products and SDKs:

- **Crystal Reports Server**—New since version XI, Crystal Reports Server provides all the functionality of BusinessObjects Enterprise but is limited to a single multi-CPU server and is aggressively priced for small- and medium-sized businesses. This solution is a very attractive option for deploying BI and reporting solutions.
- **Crystal Xcelsius**—Xcelsius 2008 is a dynamic and customizable data visualization tool that enables users of different skill levels to create insightful and engaging dashboards from any data source with point-and-click ease. Xcelsius 2008 offers a comprehensive set of new features and integrations with Crystal Reports 2008, making it easy to put the power of dashboards into the hands of business users.
- **Crystal Vision**—New to version XI release 2, Crystal Vision provides a combination of the functionality of Crystal Reports Server with the newly acquired Crystal Xcelsius dashboarding functionality.
- **Crystal Reports Engine for .NET Applications**—The only third-party tool distributed with Visual Studio .NET, this reporting component enables .NET developers to quickly embed limited but powerful reporting functionality into their .NET applications.
- **Crystal Reports Engine for Java Applications**—Embedded in Borland's JBuilder and other Java IDEs, this reporting component enables Java developers to quickly embed limited but powerful reporting functionality into their Java applications.

WHAT IS IN THIS BOOK

This book is broken down into several sections to address the varied and evolving requirements of the different users in a BI deployment.

The entire first half of the book (Parts I through III) focuses exclusively on content creation with Crystal Reports. Through hands-on step-by-step examples and detailed descriptions of

key product functionality, you learn to leverage the powerful report creation capabilities of Crystal Reports v2008. Some profiles of people who find these sections of particular relevance:

- New and mature Crystal Reports designers
- Professional Crystal Reports designers upgrading to 2008
- Existing and new OLAP Intelligence, Web Intelligence, and Desktop Intelligence (formerly Business Objects) designers and analysts
- Existing and new BusinessObjects Enterprise (formerly Crystal Enterprise) administrators
- New Crystal Reports Server administrators

The second section of the book (Part IV) focuses on the distribution or delivery of the valuable content created in the first half and additional insights into advanced content creation with Crystal Xcelsius. An introduction to Crystal Reports Server, crystalreports.com, and the offline Crystal Reports Viewer complements a comprehensive introduction to Crystal Xcelsius. This extends with an introduction to the .NET and Java SDKs around Crystal Reports. Some profiles of people who find these sections of high value:

- New Crystal Reports Server administrators
- New or existing Crystal Reports Server users
- .NET-based application developers
- Java/J2EE-based application developers
- Application developers looking to integrate report design or modification into their applications

Part I: Crystal Reports Design

Part I should familiarize you with the foundations of Crystal Reports and get you up and running as quickly as possible. It is critical for someone who is new to Crystal Reports and includes the fundamental report design concepts that even experienced users can use for the rest of their Crystal Reports–writing career. This section also provides powerful exercises and real-world usage tips and tricks with which even seasoned reporting experts can become more productive.

Part II: Formatting Crystal Reports

Part II focuses on some of the more subtle nuances of Crystal Report design: effective report formatting and data visualization through charting and mapping. Improper formatting and incorrect use of visualization techniques can make reports confusing and not user friendly. This section also provides powerful exercises and real-world usage tips and tricks, enabling mature reporting experts to become more productive.

PART III: ADVANCED CRYSTAL REPORTS DESIGN

Part III presents a host of advanced Crystal Reports design concepts that involve features such as subreports, cross-tabs, report templates, and alerts. This part also touches on advanced data access methods such as JavaBeans, XML objects, SAP, and PeopleSoft systems. The section also provides powerful exercises and real-world usage tips and tricks, enabling mature reporting experts to become more effective in their report design work.

PART IV: REPORT DISTRIBUTION AND ADVANCED REPORT DESIGN WITH CRYSTAL XCELSIUS

Part IV focuses on the different methods of distribution of the Crystal Reports content created in the first three sections. These methods include Crystal Reports Server, crystalreports.com, the .NET and Java SDKs, and the offline Crystal Reports Viewer. This section provides a comprehensive introduction to advanced visualizations and dashboard creation with Crystal Xcelsius.

EQUIPMENT USED FOR THIS BOOK

You can find various supporting material that will assist you in the completion of the exercises in this book, as well as supplemental documentation on related topics. You should have access to a computer that has at least a 450MHz Pentium II or equivalent processor, 128MB of RAM, and Windows 2000, Windows 2003, or Windows XP Professional.

WEB RESOURCES

You can find all the source code and report samples for the examples in the book, as well as links to great external content, at www.usingcrystal.com. You'll find report samples to download and code for you to leverage in your report design and sharing efforts. Also, a great deal of additional product-related information on the Business Objects suite of products including Crystal Reports, Web Intelligence, OLAP Intelligence, Desktop Intelligence, Crystal Reports Server, and BusinessObjects Enterprise can be found at www.businessobjects.com.

INTENDED AUDIENCE

This book was written to appeal to the full range of Crystal Reports, Crystal Reports Server, and Crystal Xcelsius users. You'll find this book useful if you've never used the Business Objects suite of products before, if you are a mature Crystal Reports user looking for some new productivity tips, or if you want to explore some of the new features found in version 2008 and their related SDKs.

You don't have to be an expert, but you should have a basic understanding of the following concepts:

- Database systems such as Microsoft SQL Server, Oracle, Sybase, and Informix
- Operating system functions in Windows 2003/XP/Vista
- General Internet/intranet-based concepts such as HTML, DHTML, ActiveX, and Java

Parts I through III build on each other, so skipping around those parts isn't the best approach unless you have some familiarity with Crystal Reports 2008. Even if you are familiar with Crystal Reports, many new features have been introduced in recent versions, so you are encouraged to read the entire first three sections of the book so that you don't miss anything. Part IV focuses on the different methods of content delivery, so you can approach each part independently without loss of context.

REQUIREMENTS FOR THIS BOOK

All reports are based on sample data available from the businessobjects.com website, so you have access to the same data used in this book. You'll need to install Crystal Reports to get the most out of the examples included in each chapter in the first half of the book.

CONVENTIONS USED IN THIS BOOK

Several conventions are used within this book to help you get more out of the text. Look for special fonts or text styles and icons that emphasize special information.

- Objects such as fields or formulas normally appear on separate lines from the rest of the text. However, there are special situations in which some formulas or fields appear directly in the paragraph for explanation purposes. These types of objects appear in a special font like this: `Some Special Code`. Formula examples appear on the Sams Publishing website as well.
- In some cases, I might refer to your computer as a *machine* or *server*. This is always in reference to the physical computer on which you have installed Crystal Reports.
- You'll always be able to recognize menu selections and command sequences because they're implemented like this:

  Use the File, Open command.
- New terms appear in *italic* when they are defined.
- Text that you are asked to type appears in **`boldface`**.
- URLs for websites are presented like this: http://www.businessobjects.com.

NOTE

Notes help you understand principles or provide amplifying information. In many cases, a Note emphasizes some piece of critical information that you need. All of us like to know special bits of information that make our job easier, more fun, or faster to perform.

TIP

Tips help you get the job done faster and more safely. In many cases, the information found in a Tip comes from experience rather than through experimentation or documentation.

Sidebar
Sidebars spend more time on a particular subject that could be considered a tangent but will help you be a better Business Objects product user as a result.

Real World sections provide some practical and productivity-enhancing usage insights derived from the author's real-world experience designing and deploying hundreds of Crystal Reports.

Troubleshooting sections provide some quick chapter summary notes and examples that are useful reminders on the product operations.

CHAPTER 16

FORMATTING MULTIDIMENSIONAL REPORTING AGAINST OLAP DATA

In this chapter

INTRODUCTION TO OLAP

The first 15 chapters exposed you to a wide variety of the reporting capabilities found in Crystal Reports. Up to this point, however, all the reports you created were based on relational data sources, often known as *Online Transactional Processing (OLTP)* databases, where most organizations generally keep their operational data.

In many organizations and for many people today, data reporting ends with Crystal Reports pointing at existing relational data sources such as Microsoft SQL Server, Oracle, DB2, Sybase, or even Microsoft Access. All those relational databases are designed for the efficient storage of information. These databases are not designed optimally, however, for the efficient extraction of data for aggregated analysis across multiple dimensions—that is where OLAP databases excel.

OLAP stands for *Online Analytical Processing*, which enables business users to quickly identify patterns and trends in their data while reporting against multiple dimensions at once. Examples of dimensions for analysis include time, geographic region, product line, financial measure, customer, supplier, salesperson, and so on. Crystal Reports provides powerful OLAP-based formatted reporting capabilities, and this chapter introduces them.

This chapter covers the following topics:

- Introduction to OLAP concepts and OLAP reporting
- Recently added OLAP features in Crystal Reports
- Creation of OLAP-based Crystal Reports

OLAP CONCEPTS AND OLAP REPORTING

OLAP is an analysis-oriented technology that enables rapid analysis of large sets of aggregated data. Instead of representing information in the common two-dimensional row and column format of traditional relational databases, OLAP databases store their aggregated data in logical structures called *cubes*. Designers create OLAP cubes around specific business areas or problems. Cubes contain an appropriate number of dimensions to satisfy analysis in that particular area of interest or for a specific business issue. OLAP is a technology that facilitates data viewing, analysis, and navigation. More than a particular storage technology, OLAP is a conceptual model for viewing and analyzing data. Table 16.1 highlights some common business areas and typical sets of related dimensions.

TABLE 16.1 BUSINESS AREAS AND COMMONLY ASSOCIATED OLAP DIMENSIONS

Business Area	Associated Business and Common OLAP Dimensions
Sales	Sales Employees, Products, Regions, Sales Channels, Time, Customers, Measures
Finance	Company Divisions, Regions, Products, Time, Measures
Manufacturing	Suppliers, Product Parts, Plants, Products, Time, Measures

OLAP cubes pre-aggregate data at the intersection points of their associated dimension's members. A *member* is a valid field value for a dimension. For example, members of a time dimension could be 2006, 2007, Q1, or Q2; members of a product dimension could be Gadget1, Gizmo2, DooDah1, and so on. This pre-aggregation facilitates the speed-of-thought analysis associated with OLAP.

Precalculating the numbers at the intersection points of an OLAP cube's associated dimension members enables rapid high-level analysis of large volumes of underlying data that would not be practical with traditional relational databases. Consider the example of analysis on several years of sales data by year, quarter, and month and by region, sales manager, and product. The pre-aggregated nature of OLAP facilitates speed-of-thought analysis that otherwise would not be practical when working with the phenomenal amount of data and involved calculations required to provide answers on a traditional relational (OLTP) database system—it would simply take too long.

When a Crystal Report uses an OLAP cube as a data source, it presents the multidimensional data in a two-dimensional OLAP grid that resembles a spreadsheet or cross-tab. The focus of Crystal Reports when reporting against OLAP cubes is to present professionally formatted two-dimensional (or flat) views of the multidimensional data of particular business use for report-consuming end users and not necessarily analysts requiring interactivity—the more traditional OLAP end users.

The concepts of OLAP usually become more understandable after you explore them. To that end, later sections in this chapter step you through a Crystal Reports report creation example against an OLAP cube.

RECENTLY ADDED OR CHANGED OLAP FEATURES IN CRYSTAL REPORTS

This section is specifically targeted for users of older versions of Crystal Reports. Table 16.2 lists the newly added OLAP-oriented features of recent versions and their practical use or benefit. If you are a new user to Crystal Reports or you have not previously used the OLAP reporting features in the product, you might want to skip directly to the next section.

TABLE 16.2 LATEST OLAP FEATURES IN CRYSTAL REPORTS

OLAP Feature	Feature Benefit and Value
Row/Column Dimension Parameter links	Enables the direct linking of report parameters to member selection and filtering in the column and row dimensions of the selected cube. You access this feature through either the OLAP Report Creation Wizard or the OLAP Report Settings option under the Report menu.

continues

TABLE 16.2 CONTINUED

OLAP Feature	Feature Benefit and Value
Slice/Page Dimension Parameter links	This productivity feature enables the direct linking of report parameters to pages and slices in the OLAP grid. This enables the end user to dynamically specify the values of slices and pages in the OLAP grid. You access this feature in either the OLAP Report Creation Wizard or the OLAP Report Settings option under the Report menu.
Interactive OLAP Worksheet (Analyzer) in new Cube tab	The New OLAP Analyzer feature (a Cube tab in Crystal Reports Designer) is accessed by right-clicking on an existing OLAP grid object and selecting the Launch Analyzer option. The Cube tab provides a fully functioning drag-and-drop OLAP worksheet that enables rapid selection of the most appropriate OLAP viewpoint for the Crystal Report. The associated Crystal Reports OLAP grid, where you can apply advanced formatting, reflects all changes made in the Analyzer worksheet.
Interactive drill-down of OLAP grids in Preview tab	The OLAP grid presented in the Crystal Reports Preview tab is more fully functional. In addition to having access to advanced OLAP grid functionality including calculations, exception highlighting, sorting, filtering, and member reordering from the right-click button, the OLAP grid now enables the report designer to expand (drill-down) and contract members directly from within the Preview tab.
New and improved data sources	At the time of writing, Crystal Reports 2008 provides OLAP access to multiple versions of Hyperion Essbase, DB2 OLAP, SQL Server Analysis Services, and SAP BW.

The following sections explore the creation of an OLAP report through the OLAP Report Creation Wizard, the added value of the OLAP Expert, and the advanced interactivity features of Crystal Reports.

USING THE OLAP REPORT CREATION WIZARD AND OLAP EXPERT

Crystal Reports provides two easy ways to create reports against OLAP data sources. As introduced in Chapter 1, "Creating and Designing Basic Reports," Crystal provides several report wizards to step you through the creation of some popular types of reports—one of those is OLAP. The OLAP Report Creation Wizard involves five steps and walks you through the process of creating an OLAP grid and an optional supporting graphic based on an existing data source. You can access the OLAP Report Creation Wizard when you are creating a new report.

The second method of creating an OLAP-based report is through the OLAP Expert that you access from the Insert OLAP Grid on the Insert menu. This expert provides six tabs that step through the creation of an OLAP grid to be placed anywhere on a report.

The two methods of creation offer very similar degrees of functionality, and their respective dialog screens and tabs are almost identical. The OLAP Report Creation Wizard provides a built-in Charting screen not found in the OLAP Expert, whereas the OLAP Expert provides Style Customization and Label tabs not found in the OLAP Report Creation Wizard.

NOTE

Although Crystal Reports has been designed to report off of numerous multidimensional/OLAP databases including Hyperion Essbase, Microsoft SQL Server Analysis Services, and SAP BW, for the purposes of demonstration in this chapter, examples will be based on the SQL Server 2005 sample Sales and Employee cube—FoodMart. If a different OLAP database is available, the general principles should be followed against that native OLAP cube.

SPECIFYING AN OLAP DATA SOURCE

The OLAP Data tab (or screen in the OLAP Report Creation Wizard) requests the OLAP data source on which the report is to be based. This wizard and its associated dialog screens are to multidimensional data sources what the data explorer, introduced in Chapter 1, is to relational data. Figure 16.1 shows the OLAP Data screen from the OLAP Report Creation Wizard.

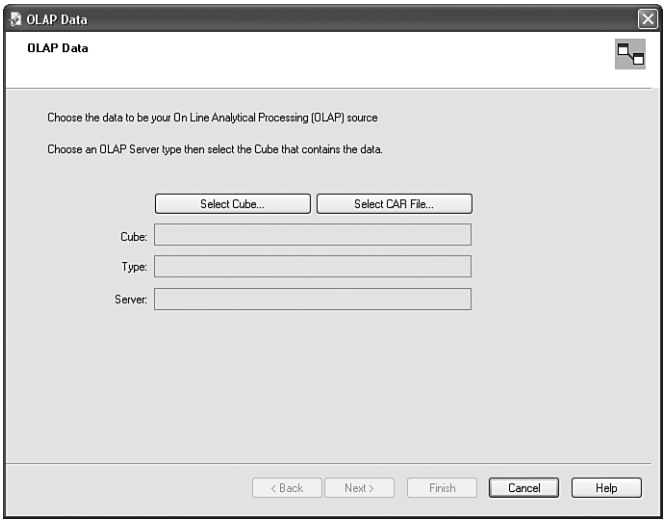


Figure 16.1
The OLAP Data dialog from the OLAP Report Creation Wizard.

When this screen first displays, you must use the Select Cube button to select a cube. Clicking on this button opens the OLAP Connection Browser, displayed in Figure 16.2. From the tree control presented in this dialog, select the desired cube.

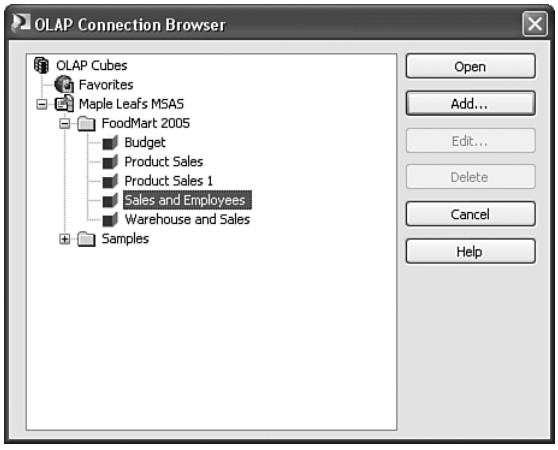


Figure 16.2
The OLAP Connection Browser enables the specification of an OLAP data source for the involved Crystal Report.

To help you learn about the creation of an OLAP-based Crystal Report, here are the introductory steps to doing exactly that against SQL Server 2005's sample FoodMart Sales and Employee cube (provided at usingcrystal.com). Other exercise steps will appear throughout the chapter after the presentation of related text and figures. For now, start the OLAP Report Creation process with the following steps:

1. Create a New Crystal Report by selecting the OLAP Cube Report Wizard from the Crystal Reports Start Page.
2. Click the Select Cube button from the OLAP Data dialog.
3. Assuming that the location of the OLAP Server has not already been identified to the OLAP Connection Browser, click the Add Server button and identify the location of your SQL Server Analysis Server and the sample Sales and Employees cube. Figure 16.3 shows the New Server dialog.
4. Enter a caption for the OLAP server you are adding. This caption appears in the OLAP Connection Browser. Enter the name of the SQL Server Analysis Server for the server name and click on OK.
5. Back in the OLAP Connection Browser, navigate into the presented list of servers (there will likely be only the server you just added) and double-click on the sample Sales and Employees cube.
6. Before clicking on the Next button to proceed, you see the Page Dimension Selector dialog. New to version 2008, from here you can select the specific dimensions from the cube that you would like to report on. For this exercise, select the highest level dimension from each group and click on OK to move forward. In the future you can use this functionality to restrict retrieved data/dimensions from larger cubes.

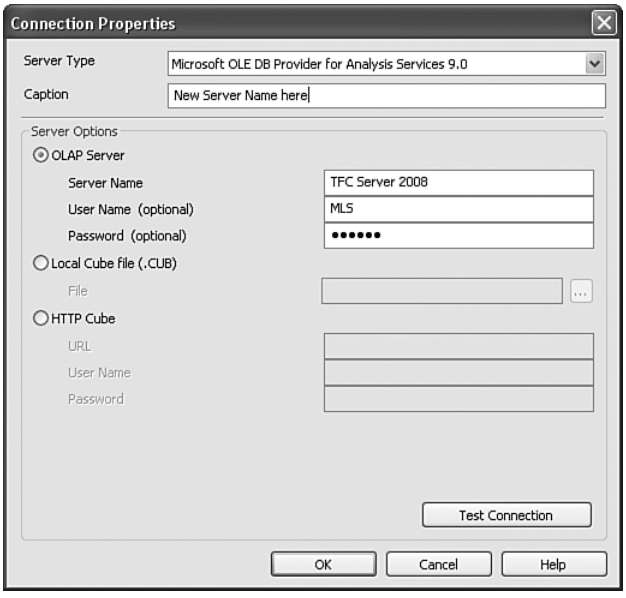


Figure 16.3
The Connection Properties dialog for a new OLAP server creates new connections to OLAP data sources.

NOTE

A Select CAR File button exists on the Data screen of the OLAP Report Creation Wizard, in addition to the Select Cube button. The name CAR comes from the legacy name Crystal Analysis Reports (CAR). CAR files are created with the sister online OLAP product to Crystal Reports used within BusinessObjects Enterprise. (This tool was formerly called Crystal Analysis.) CAR files can be treated as multidimensional data sources because they contain connectivity information to an underlying OLAP data source.

SPECIFYING OLAP ROWS AND COLUMNS

The Rows/Columns dialog screen enables you to select both the dimensions and fields to be presented along the columns and rows of the OLAP grid. The Dimensions list box depicted in Figure 16.4 lists all the available dimensions in the selected cube/data source.

To select a dimension for placement in the rows section or the columns section of the OLAP grid, highlight the desired dimension and click either the column or row arrow (>) button. It is possible to select multiple dimensions for display and to have them nested in the OLAP grid by successively selecting multiple dimensions for either the rows or the columns section. It is also possible to remove dimensions from the existing row or column list boxes; however, you cannot leave the column and row dimension list boxes empty.

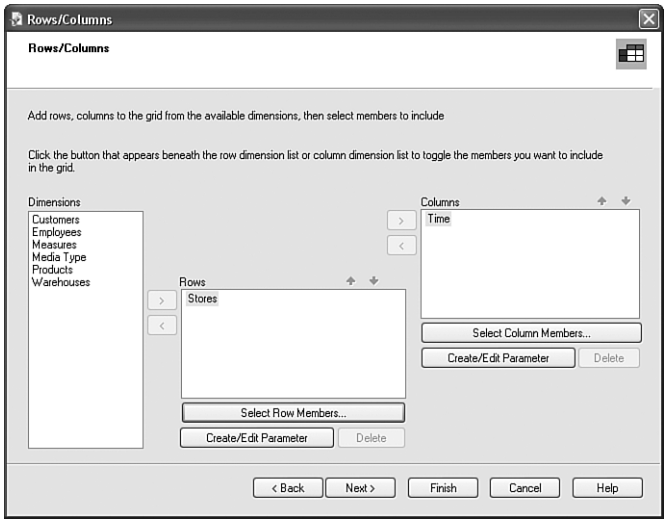


Figure 16.4
The Rows/Columns dialog of the OLAP Report Creation Wizard.

After selecting the desired dimensions, you can select a subset of the fields (also known as *members*) for those dimensions by using the Select Row Members or Select Column Members button. Examples of this include selecting only a certain subset of provinces or states in a region dimension or, alternatively, selecting only a certain year's worth of data in a time dimension. By highlighting a dimension in either the Rows or the Columns list box and then selecting the appropriate selection button, you can use the Member Selector dialog to select a subset of the members for the involved dimension, as shown in Figure 16.5.

Figure 16.5
Use the Member Selector dialog to select default column and row dimension members.

The last and newest feature of the Rows/Column screen is the Create/Edit Parameter functionality provided for each of the row and column dimensions. This capability provides the business user or report consumer with the capability to interact with the report and control its content by entering parameters that directly affect the dimension members displayed in the OLAP grid(s) on the report.

Because Chapter 5, "Implementing Parameters for Dynamic Reporting," covered parameters in detail, you are familiar with this topic. Of significance for this wizard screen is that the parameter creation process is directly accessible here, and this facilitates the rapid development of formatted and interactive OLAP reports. If necessary, review Chapter 5 for a refresher on creating and editing parameters.

TIP

The Member Selector dialog provides some powerful shortcuts for the selection of certain logical groups of members. These selection shortcuts are accessible through either the Select drop-down box or by right-clicking on any part of the Member Selection list box. Sample selection shortcuts include the ability to select all base level members or all members at a highlighted level.

Continuing with the creation of the sample report started in the last section, the following steps walk through the Rows/Columns screen part of this report creation example and allow for the refinement of the data to be viewed in the OLAP grid. Follow these steps to add rows and columns to your OLAP-based report:

1. Select the Stores dimension from the available dimensions list as the Row dimension using the row dimension arrow button. (Note: It will likely be necessary to remove a default dimension to ensure that this is the only dimension in the row dimensions list view.)
2. Using the Select Row Members button, select all the store country locations (for example, Canada, USA, and Mexico) from the Member Selector dialog, but deselect the aggregated top-level All field. This enables the OLAP grid to present all the different store types down the side of the grid as rows.
3. Select the Time dimension from the available dimensions list as the Column dimension using the column dimension arrow (>) button. (Note: It will likely be necessary to remove a default dimension to ensure that this is the only dimension in the column dimensions list view.)
4. Using the Select Column Members button, select the quarters Q1, Q2, Q3, and Q4 from the year 1998 from the Member Selector dialog, but be sure not to select any children members. This enables the OLAP grid to present a comparison of the four quarters of data in four side-by-side columns.
5. Click the Next button to proceed.

At this point, you will review the concept of OLAP dimension filters and pages in your OLAP report.

SPECIFYING OLAP DIMENSION SLICES (FILTERS) AND PAGES

The Slice/Page dialog of the OLAP Report Creation Wizard, shown in Figure 16.6, enables you to select values or members for the dimensions not selected to be row or column dimensions. In the OLAP world, these dimensions are *paged* or *sliced dimensions*.

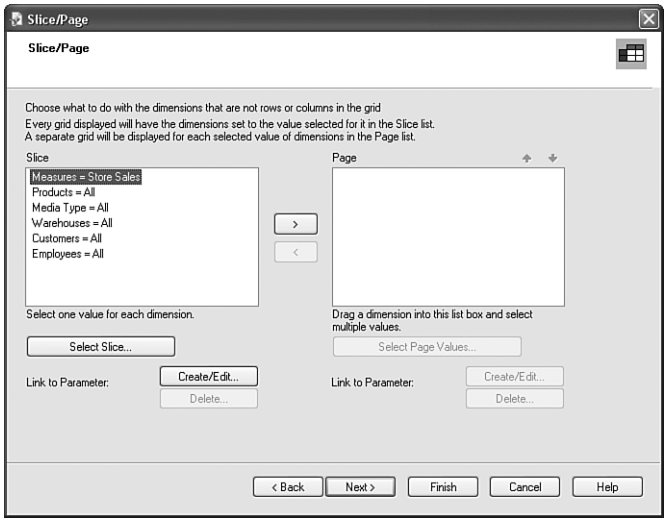


Figure 16.6
The Slice/Page screen of the OLAP Report Creation Wizard allows manipulation of the dimensions not selected for use on either the rows or columns.

The Slice list box lists all the paged dimensions and their current member settings. The default setting is usually all members for any given dimension. An example is that for the Media Type Dimension, the default slice setting is All. To change the member selection (slice) for a particular dimension, that dimension must be selected in the Slice list box, and the Select Slice button must be used to open the familiar Member Selection dialog (refer to Figure 16.5). This dialog is identical to the Member Selector dialog used previously except that you can choose only one member from the selected dimension. If multiple members from a slice dimension are required in a report, use the Page list box and create separate pages/grids for each selected value.

The Page list box is initially empty but can contain any dimensions outside the row and column dimensions that require multiple member selection. An example could involve selecting the three countries of North America as store regions. The selection of multiple values for a paged dimension creates completely separate grids (based on the same preselected rows and columns) for each selected member value. To select multiple members for a dimension, select the involved dimension in the Slice list box and move it to the Page list box using the transfer arrow buttons between the list boxes. After you move the dimension to the Page list box, the Select Page Values button enables multiple member selection through the Member Selector dialog.

The last, but perhaps most powerful, feature of the Slice/Page screen is the Link to Parameter functionality provided for each of the filtered and paged dimensions. This capability provides the business user or report consumer with the capability to interact with the report and control its content by entering parameters that directly affect the information displayed in the OLAP grid(s) on the report.

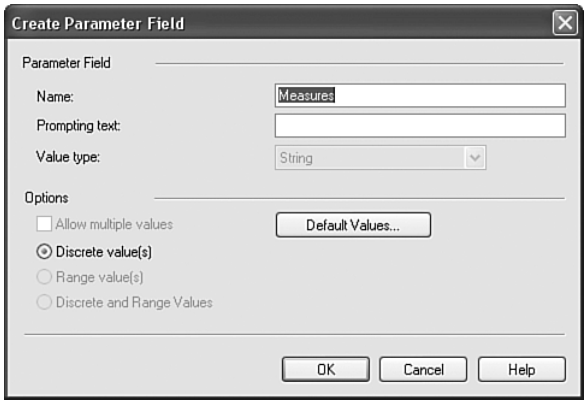
Of significance for this wizard screen is that the parameter creation process is directly accessible here, which facilitates the rapid development of formatted and interactive OLAP reports.

→ For more information on creating and editing parameters, **see** "Creating and Implementing Parameters Fields," **p. 134**

Continuing with the creation of the sample report, the following steps walk through the Slice/Page dialog part of this report creation example and enable you to select the measure to display in the OLAP grid. Follow these steps to select measures on the page/slice dimensions:

1. Select the Measures dimension from the Slice list box.
2. Instead of selecting a specific filter using the Select Slice button, click the Link to Parameter Create/Edit button to enable the business user to dynamically select this slice every time the report runs. The Create Parameter Field dialog appears, as shown in Figure 16.7.

Figure 16.7
The Create Parameter Field dialog called from the Slice/Page screen.



3. In the Prompting Text text box, enter the text that you want your user to be prompted with when this report runs. In this case, it could be something similar to `Please select the measure to be used in your report`. Also, ensure that the Discrete Value(s) radio button is active because a range of entries is not required or allowed here.
4. To avoid requiring users to type in any text, defaults can be set so that selection from a drop-down box is possible. To do this, click the Default Values button. The dialog in Figure 16.8 appears.
5. The Measures table is preselected because the report respects the association with the previously highlighted dimension. Move all the available member values for the Measures dimension to the Description list box by clicking on the Select Default Values button and selecting all the members through the familiar Member Selector dialog.

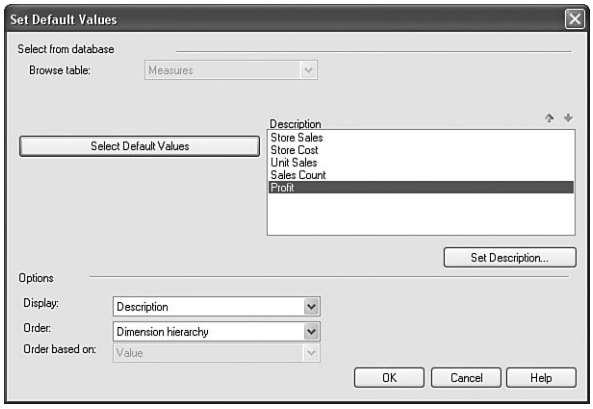


Figure 16.8
The Set Default Values dialog for the OLAP slice parameter.

6. Ensure that the Display drop-down box has Description selected and that the Order drop-down box has no sort selected. Click on OK twice to get back to the Slice/Page dialog of the OLAP Report Creation Wizard.
7. When you return to the Slice/Page dialog, highlight the Products dimension in the Slice list box, and click on the arrow transfer/select button to move it to the Page list box. The Member Selection dialog immediately appears with the Products Dimension Hierarchy presented.
8. Select the Food and Drink Product types (two of the children of All Products), and deselect the All Products field. Individual OLAP grids are created for each of the drink products and the food products. If this isn't clear now, it should make more sense when you visualize the report.
9. Click on OK and then Next to proceed.

CAUTION

After parameters or multivalue paged dimensions have been set in the OLAP Report Creation Wizard, you can access them for editing only through the OLAP Design Wizard under the main Report menu. These settings are not configurable in the OLAP Expert.

ADDING REPORT STYLES IN THE OLAP REPORT CREATION WIZARD

The Style dialog in the OLAP Report Creation Wizard enables you to select any one of a predetermined number of styles for OLAP grids available in Crystal Reports. Figure 16.9 displays the Style dialog. The styles are a good starting point for formatting the OLAP grids on your reports. You can enhance them through the Customize Style tab of the OLAP Expert (described later in the chapter) and by using many of the advanced formatting features you have already learned about.

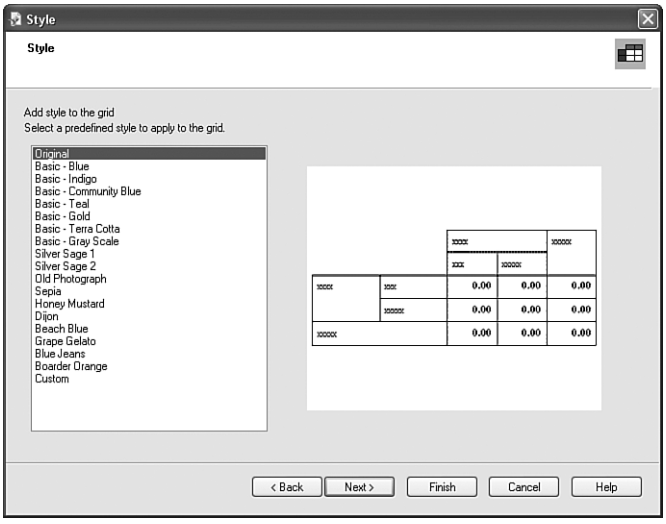


Figure 16.9
The Style dialog of the OLAP Report Creation Wizard.

ADDING CHARTS VIA THE OLAP REPORT CREATION WIZARD

The Chart dialog provided in the OLAP Report Creation Wizard enables you to quickly add graphics to the OLAP report being created. The graphics available in the wizard, shown in Figure 16.10, are only a subset of the graphics available in Crystal Reports (see Chapter 8, "Visualizing Your Data with Charts and Maps," for a refresher), but they enable a rapid visualization of your OLAP data without using the Chart Expert.

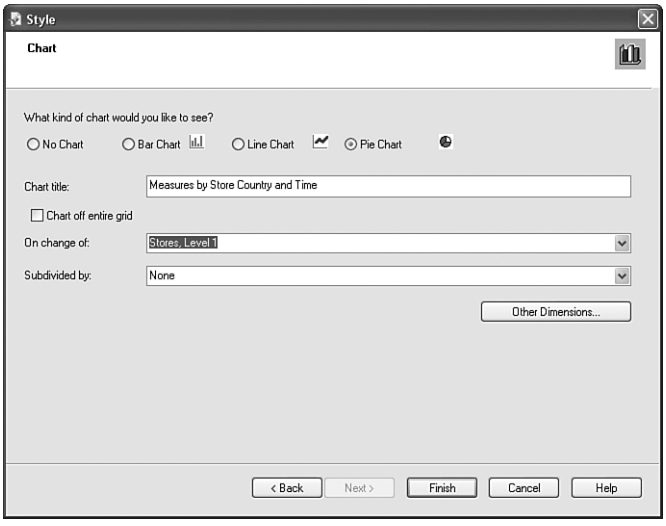


Figure 16.10
The Chart dialog of the OLAP Report Creation Wizard enables you to select between different basic chart types.

Aside from selecting the type of chart (bar, line, or pie) and specifying a title on this screen, you must specify an On Change Of field with an optional Subdivided By field before this screen is complete. As Chapter 8 discussed, On Change Of is the data source field that provides the breaking point for the involved graphic. Examples could include country, region, year, store, product, and so on. The Subdivided By field can provide a second variable to base your charts on. An example of a two-variable OLAP chart using the FoodMart sample cube is a chart showing salary information by year and then subdivided by store type.

To complete the OLAP report creation process, the following steps take you through the addition of a style, a chart, and the creation of the finished report:

1. On the Style dialog, select any style that suits your preference, and click on the Next button.
2. On the Chart dialog, select Pie Chart as the chart type by selecting the associated radio button. This provides a nice way of visualizing comparables across different store types.
3. Give your chart a title similar to **`Measures by Store Country and Time`** by entering it in the Chart Title text box.
4. Select all grid column fields as the On Change Of field. This facilitates the comparison of the three store locales. Select all the grid row fields as the Subdivided By drop-down selection.
5. Click on the Finish button on the OLAP Report Creation Wizard. The wizard prompts you to select a parameter for the Measure dimension. After you select Store Sales (or another field if you prefer), the wizard generates a report that looks similar to Figure 16.11.

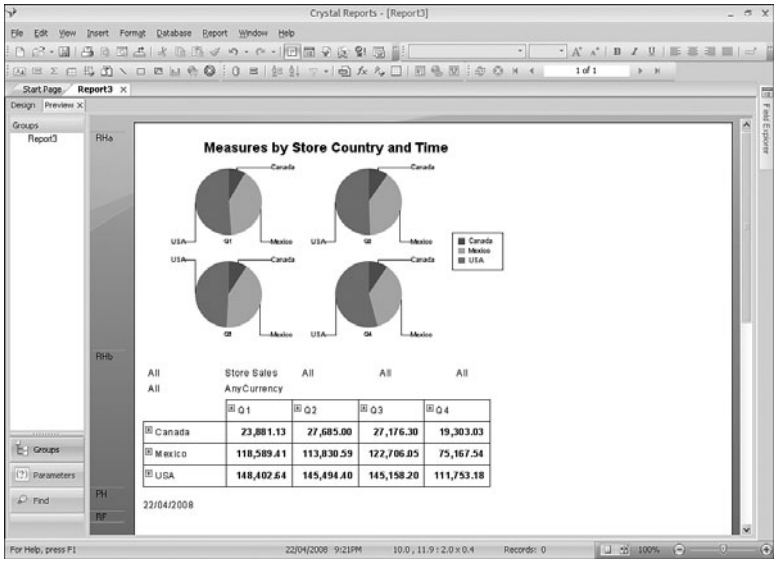


Figure 16.11
The sample OLAP report created using the OLAP Report Creation Wizard.

The OLAP Report Creation Wizard provides an efficient and effective method to getting value out of OLAP data in a short time. After placing an OLAP grid or OLAP chart on your report through the wizard, you can perform further formatting and analysis through a variety of built-in Crystal Reports formatting tools. The next two sections explore further customization options, and the three subsequent sections discuss the powerful interactivity available in Crystal Reports OLAP objects.

CUSTOMIZING STYLES IN THE OLAP EXPERT

After an OLAP grid has been added to a report, with or without a selected style, Crystal Reports provides the capability to enhance and customize the formatting of that grid through the Customize Style tab of the OLAP Expert. Figure 16.12 shows the OLAP Expert dialog, which you access by right-clicking on an existing OLAP grid object and selecting OLAP Grid Expert or by selecting the Insert OLAP Grid option from the Insert menu.

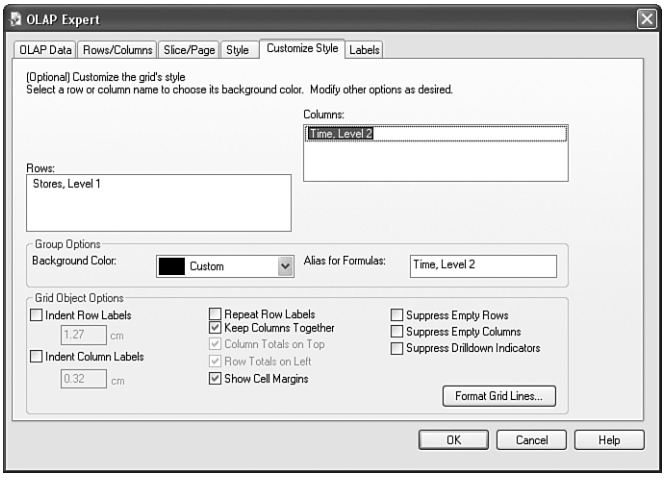


Figure 16.12
The OLAP Expert dialog provides the capability to edit many OLAP grid display properties including the customization of styles.

Four of the tabs in the OLAP Expert have identical functionality to that presented in the previous OLAP Report Creation Wizard sections. The Customize Style tab shown in Figure 16.12 is unique to the OLAP Expert and provides the capability to fine-tune the formatting of the row and column dimensions selected for the involved OLAP grid. By selecting any of the column or row dimensions from the presented list boxes, you can select custom colors for the backgrounds of the OLAP grid row and column headings. The Customize Style tab offers a number of formatting options for the presentation of the grid, including indentation, blank column/row suppression, margins, and labels. Also provided is an option to format grid lines, as shown in Figure 16.13. This dialog enables granular level formatting and selection of grid lines for display on the OLAP grid's layout.

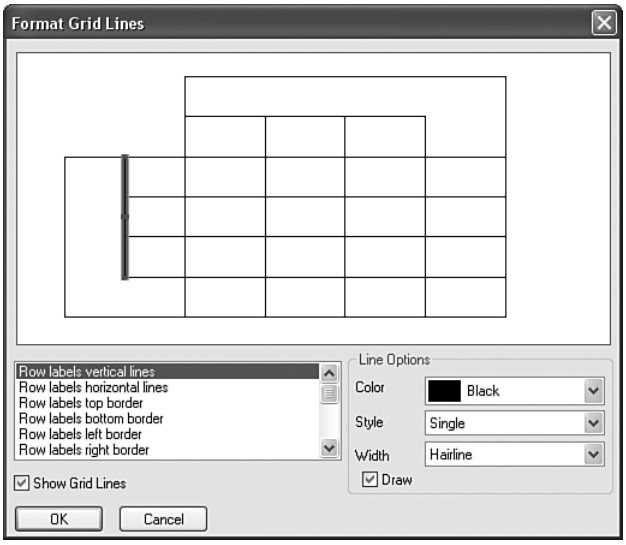


Figure 16.13
The Format Grid Lines dialog is accessed from the Customize Style tab of the OLAP Expert dialog and enables granular-level control of the grid lines in the OLAP grid.

CUSTOMIZING LABELS IN THE OLAP EXPERT

The Labels tab of the OLAP Expert, shown in Figure 16.14, provides the capability to customize the display of the paged dimension (non-row/column dimensions) labels on the OLAP grid.

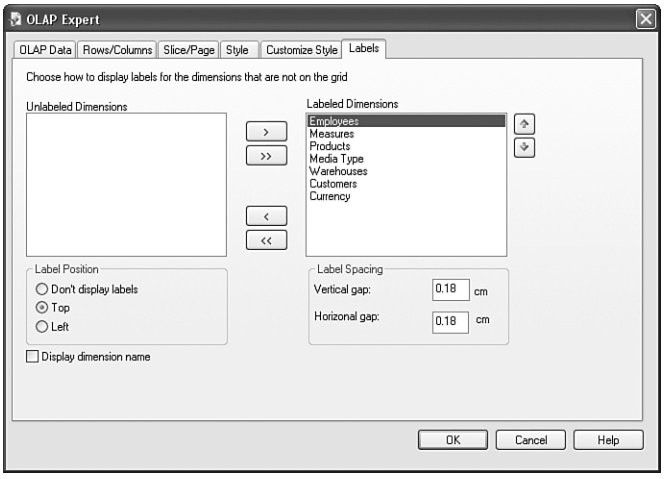


Figure 16.14
The Labels tab of the OLAP Expert enables you to specify display properties around the OLAP grid's dimensions.

Paged/sliced dimension member values for the display grid can be displayed or hidden by simply moving the selected dimension between the unlabeled dimension and labeled dimension list boxes using the transfer arrow (>, >>, <, <<) buttons. You can select additional labeling options such as label location, label spacing, and dimension names in this tab.

ADVANCED OLAP REPORTING

Up to this point, the OLAP Expert and OLAP Report Creation Wizard have demonstrated the capability of Crystal Reports to rapidly create OLAP-based reports. In addition to those capabilities, Business Objects provides advanced analytic capabilities against OLAP data sources through some advanced OLAP-oriented features in Crystal Reports and through a set of online OLAP functionality via BusinessObjects Enterprise's Voyager functionality (formerly called OLAP Intelligence and before that Crystal Analysis). The last four sections of this chapter introduce some of these advanced features for Crystal Reports.

INTERACTING WITH THE OLAP GRID

Crystal Reports provides some powerful interactive OLAP features from within the Crystal Reports Preview and Design tabs. Figure 16.15 displays the right-click menu that appears when you right-click on the year Q4 member in this chapter's sample report.

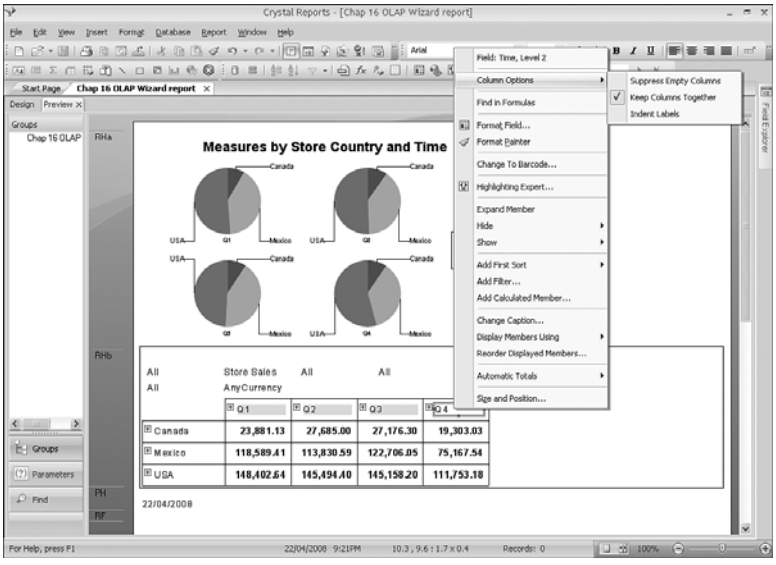


Figure 16.15
The right-click menu provides access to advanced OLAP features.

Advanced features made available here include conditional member highlighting, setting column display options, hiding and showing members for asymmetrical reporting, adding calculations, adding filters, reordering members, changing the member caption, expanding members (that is, drilling into the children members), adding sorts, and adding automatic totals to the OLAP grid. Although exploring these features in detail is beyond the scope of this chapter, it is important to note their availability for enhancing your OLAP grid presentations and reports. For detailed information on all these functions, you can review a legacy chapter on OLAP Intelligence that is available at www.usingcrystal.com.

One feature of note is the active nature of the column and row dimensions in the OLAP grid. By double-clicking on any member in either the row or column headings and assuming that the selected member has lower level members (children), the OLAP grid dynamically expands to include that member's children in the grid. In OLAP parlance, this is *drilling down*. Figure 16.16 shows the result of drilling down on the Q4 Header in this chapter's sample report. An alternative means to drilling down is to click on the + icon displayed beside any row or column dimension member.

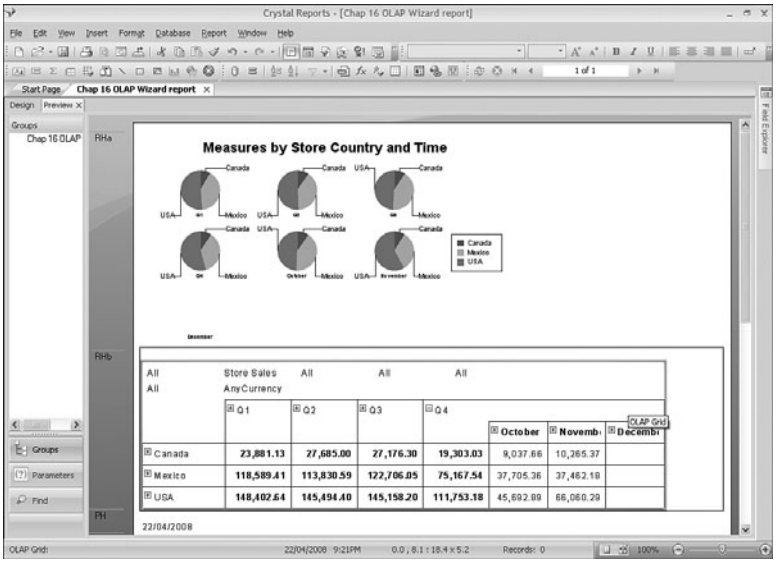


Figure 16.16
Sample OLAP-based report with Q4 member's children expanded.

A dimension member can subsequently have its children contracted by double-clicking on the parent member or clicking on the – icon beside the involved parent member. This feature enables you to interactively determine the best static viewpoint to provide to the business user audience for the report.

PIVOTING THE OLAP GRID

After an OLAP grid has been added to a report, as in this chapter's sample, Crystal Reports provides the capability to easily swap the grid's columns and rows. OLAP parlance calls this *pivoting* the OLAP grid. Figure 16.17 highlights this chapter's sample report after pivoting with this function. To access this function, right-click on the OLAP grid and select the Pivot OLAP Grid option. Pivoting the OLAP grid does not affect any OLAP charts or maps already on the report.

This function is particularly useful when attempting to decide which viewpoint of the involved OLAP grid is most helpful to the business users of the report.

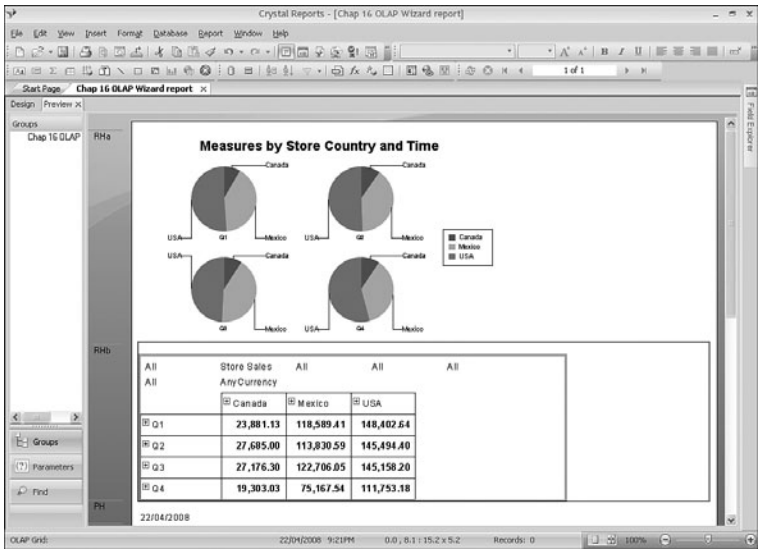


Figure 16.17
A preview of the sample report after pivoting the OLAP grid. Notice how the chart and the grid have changed.

USING THE CUBE VIEW FUNCTIONALITY

The Cube View (previously called the OLAP Analyzer) is a powerful worksheet analysis tool introduced in version 9 of Crystal Reports. The Cube View is initiated through the View Cube option on the right-click menu of the OLAP grid (make sure that you don't have any specific grid objects selected) and is accessed through the Cube View tab in the Crystal Reports Designer (see Figure 16.18). Report designers and analysts familiar with other OLAP interface tools are instantly comfortable with the Analyzer because it provides access to the OLAP cube through a traditional OLAP worksheet.

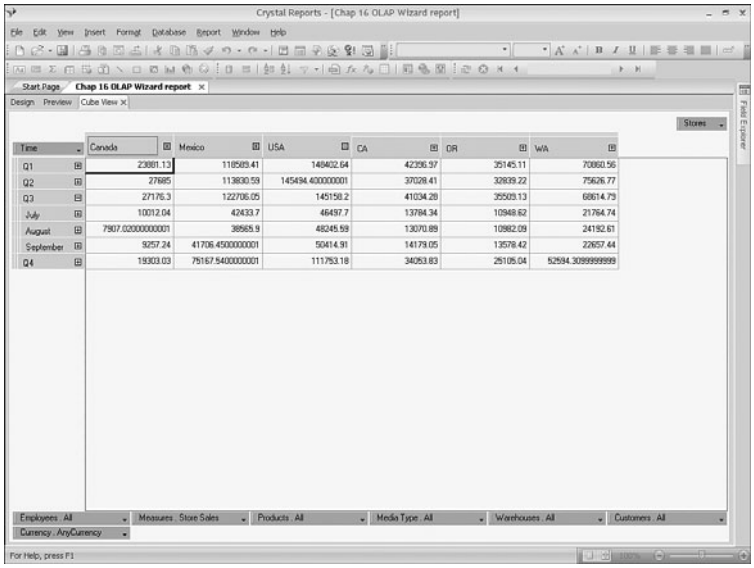


Figure 16.18
The Cube View tab launched by the OLAP Analyzer provides a powerful analytic tool for report designers and power users.

The Cube View tab's worksheet is designed for rapid analysis of the underlying OLAP data through a rich and interactive interface not available in the OLAP grid presented in the Crystal Reports Preview tab. Dimensions can be rapidly shifted, swapped, and nested by double-clicking on them and dragging them into any row, column, or paged dimension area. A dimension member can be quickly expanded and contracted by clicking on its associated + or – icon. A right-click menu in the OLAP Analyzer view of the cube offers access to additional calculations, sorts, filters, automatic totaling, exception highlighting, data analysis, and custom captions.

The Cube View is a powerful report design tool because it lets Crystal Reports developers create impressive flat views of the underlying multidimensional/OLAP data in a short timeframe and subsequently format the created OLAP grid in the Preview tab.

CAUTION

Although both the Cube View tab and the in-place OLAP grids within the Crystal Reports Designer offer much of the same functionality, not all the work handled in the Cube View necessarily translates back to the related OLAP grid on Crystal Reports. Exception Highlighting and Field Formatting are two examples of functionality that does not cross over. It is generally recommended that the majority of formatting work be done in-place within the Crystal Report's Design or Preview tabs and that cube and dimension orientation be the primary focus of the Cube View tab.

USING CHARTS AND MAPS BASED ON OLAP GRIDS

As described in Chapter 8 and discussed briefly in the "Adding Charts via the OLAP Report Creation Wizard" section earlier in this chapter, OLAP grid data can be presented through visually appealing charts and maps. To create a chart or a map based on OLAP data, an OLAP grid must pre-exist on your report as a data source to form the basis of the chart or map. Selecting the Insert Chart or Map command from the Insert menu (or the respective icons on the Insert toolbar) enables the creation of an OLAP-based visualization.

The creation process for both charts and maps requires the specification of an On Change Of field. This is the field that the chart or map breaks its summaries on (for example, country, state, product, sales rep, and so on). You can specify an optional Subdivided On field as well. The results of specifying an extra variable to divide the data on has different results for various chart types. Explore various charts to find those most suitable for your business problem. Using the Subdivided On field with a map adds a bar or pie chart to every main region on the selected map. An example of this might be a pie chart depicting the breakdown of sales for each country.

CAUTION

It is imperative that the On Change Of field be a geographic-based field when creating a map. Otherwise, the mapping component returns an empty map.

TROUBLESHOOTING

ADDING AN OLAP GRID TO AN EXISTING REPORT

I want to add an aggregated OLAP grid view to an existing drill-down report.

You can quickly accomplish this by accessing the Insert OLAP Grid functionality from the main Insert menu. An alternative approach that might make sense in certain situations is to insert a subreport that points to the involved OLAP data source. Using a subreport to host the OLAP grid enables you to dynamically pass in parameters from the main report to the subreport and its associated OLAP grid. These parameters can dynamically filter the columns, rows, and slices of the involved OLAP grid(s).

CRYSTAL REPORTS IN THE REAL WORLD—OLAP SUMMARY REPORT WITH DRILL-DOWN

The scenario discussed here describes the flexibility behind accessing multidimensional and relational data sources in one report. The benefit of this type of functionality is to enable the user to see aggregated information coming from a cube while allowing drill-down on the relational data to provide greater detail. By using parameters in this report, you let the user decide which information elements to display.

1. Start by creating a simple sales report against the sample Xtreme data source. For the data, select the First Name, Last Name, and Last Year's Sales fields from the Customer table. Group the report by region, city, and then customer. Hide the Details section and the City and Customer groups and enable drill-down on these sections. The report at design time should look like Figure 16.19. Before moving on, add Summary fields for Last Year's Sales into each of the Group Header fields (Country, Region, and City). You can quickly accomplish this by using the new (in version 2008) Add to All Group Levels check box in the Insert Summary dialog.
2. Now add to this report an OLAP grid against the sample cube used earlier in this chapter—Sales and Employees from Foodmart. Using the steps described earlier in this chapter, point the grid at the sample Sales and Employee OLAP cube selecting only the Measures, Time, and Stores dimensions. Select the Stores dimension for the rows and the Time dimension for the columns. Change the Stores rows to include only USA, Canada, and Mexico to limit the number of rows displaying in the report. Also change the Time dimension members selected to Q1, Q2, Q3, and Q4 of 1998.
3. Drop the OLAP grid in the Report Header area. Now insert a bar chart based on the relational source that displays Last Year's Sales on change of values in the City field and place the chart in the Group Header for Country to enable the user to visually understand the contribution of sales from each of the selected cities. In design view, the report should look similar to Figure 16.20. Perform the same filtering task in the report Select Expert so that the relational data source is limited to the same three countries (USA, Canada, and Mexico).

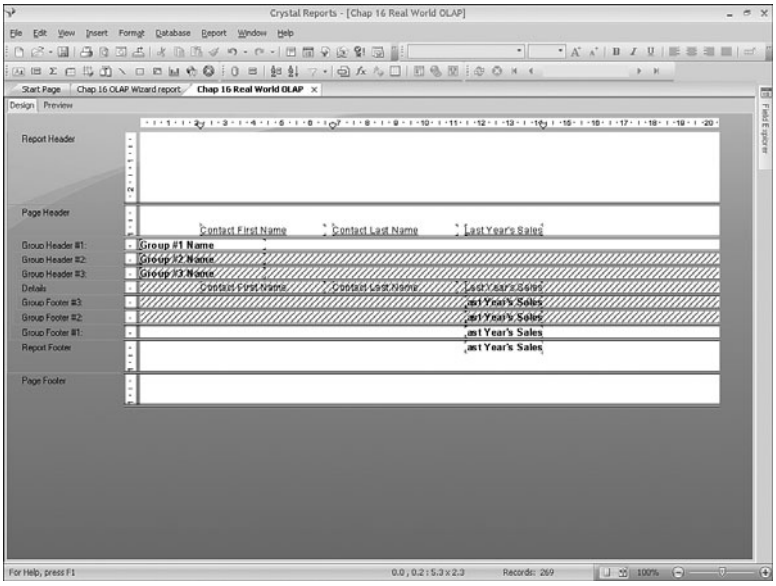


Figure 16.19
Framework for drill-down integrating both relational and OLAP data.

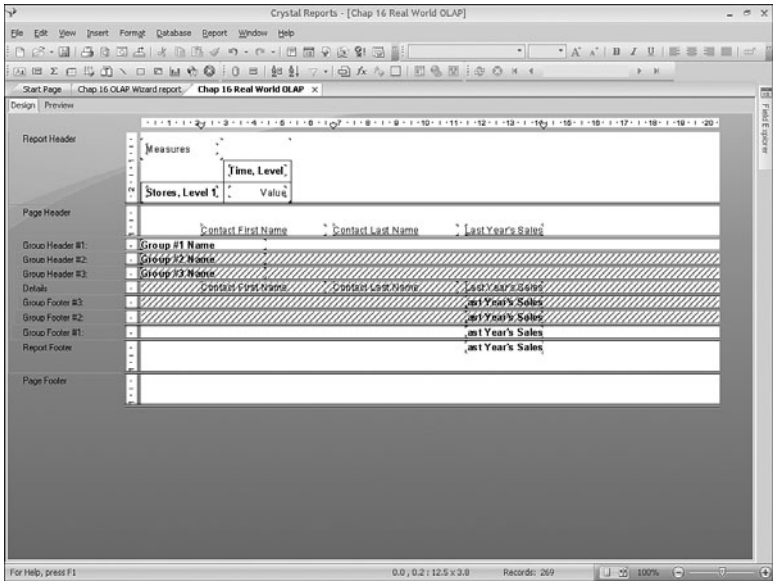


Figure 16.20
A report using both OLAP and relational data sources. The pie chart based on the relational data enables drill-down into the relational data details.

4. If the user viewed this report, he would currently see both the chart and the OLAP grid at the top of the report summarizing the same information but sourced from two different data sources: a pre-aggregated SQL Server data cube and a relational database. (This example assumes that similar data is the basis for both data sources.) To enable end users to turn off the grid display, create a parameter field that specifies whether to

display the grid. This enables users to decide whether they want to look at the summary information in both a grid and chart format or only in a chart.

5. Create a parameter of Boolean type called Display Grid.
6. Conditionally suppress the Report Header section containing the grid based on the values supplied to the parameters by right-clicking on the Report Header and selecting Section Expert from the Report Explorer. Click on the X+2 formula button next to the suppress option. Inside the formula editor, type

```
{?Display Grid}=false
```

and close the editor. Now when a user runs the report, he is prompted to select whether he wants to see the summary OLAP grid. Save the report. On display, it should look similar to Figure 16.21.

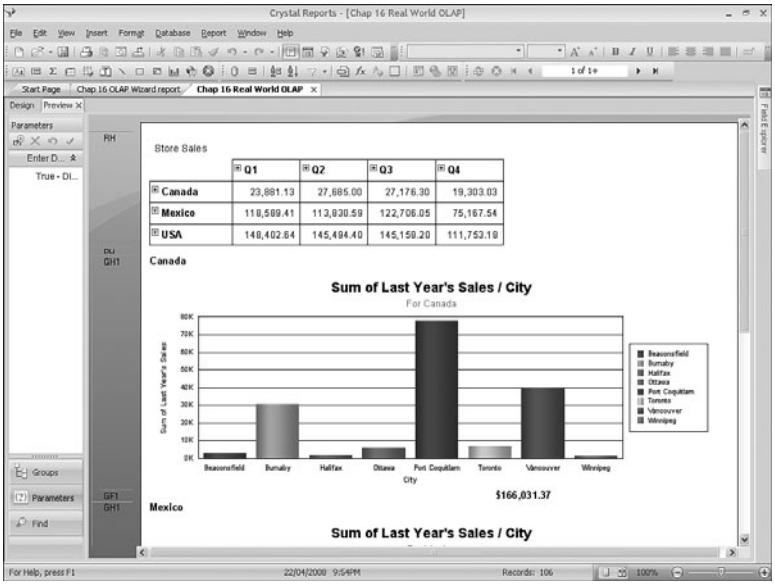


Figure 16.21
Report showing both the OLAP grid and charts and enabling drill-down from the high-level summary information displayed from the OLAP grid into the relational details.

This example illustrates how to combine relational and multidimensional data in one report to allow for different views based on the same underlying data. This allows drill-down on relational elements and provides aggregate header information for views on summary OLAP data.

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