

CRYSTAL REPORTS SERVER XI

Functional Overview

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EXECUTIVE SUMMARY

Crystal Reports® Server is a complete reporting solution that helps small- to mid-sized organizations create, manage, and deliver reports via the web or embedded in enterprise applications. Powered by the proven and trusted BusinessObjects™ Enterprise platform, it provides a powerful services-oriented architecture (SOA) that is ideal for reporting.

As a technical overview of Crystal Reports Server XI, this paper outlines the product's overall components, services, and capabilities, which are designed to address the complete reporting process—from report integration with portals and enterprise applications, to report management and delivery, to data access and report design. Documentation available with Crystal Reports Server provides additional installation and system management information.

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Audience: IT

FUNCTIONAL OVERVIEW

Crystal Reports Server is powered by the proven services-oriented architecture of BusinessObjects Enterprise. BusinessObjects Enterprise is a complete business intelligence (BI) platform that provides specialized end-user tools, including Crystal Reports, BusinessObjects Web Intelligence®, OLAP Intelligence, BusinessObjects Performance Manager, and BusinessObjects Dashboard Builder. BusinessObjects Enterprise also includes data integration capabilities from BusinessObjects Data Integrator, which is architected using modern web standards with an industry-standard communication framework to tie all components and services together.

Crystal Reports Server harnesses the reporting services and components of the BusinessObjects Enterprise architecture to offer small and medium-sized businesses a proven reporting solution. It addresses the complete reporting process—from data access and report design, to report management and delivery, to report integration with portals and enterprise applications.

FUNCTIONAL ARCHITECTURE

Crystal Reports Server is composed of separate—yet interconnected—components and services optimized for specific tasks. These components and services include:

- User interaction tier for end-user report viewing and interaction
- Web and application services for customized report integration with portals and applications
- Web based management tools for administration of Crystal Reports Server services and objects
- Platform services for report publishing, security, and processing
- Report creation tool for authoring your Crystal Reports
- Data services for comprehensive and flexible data access

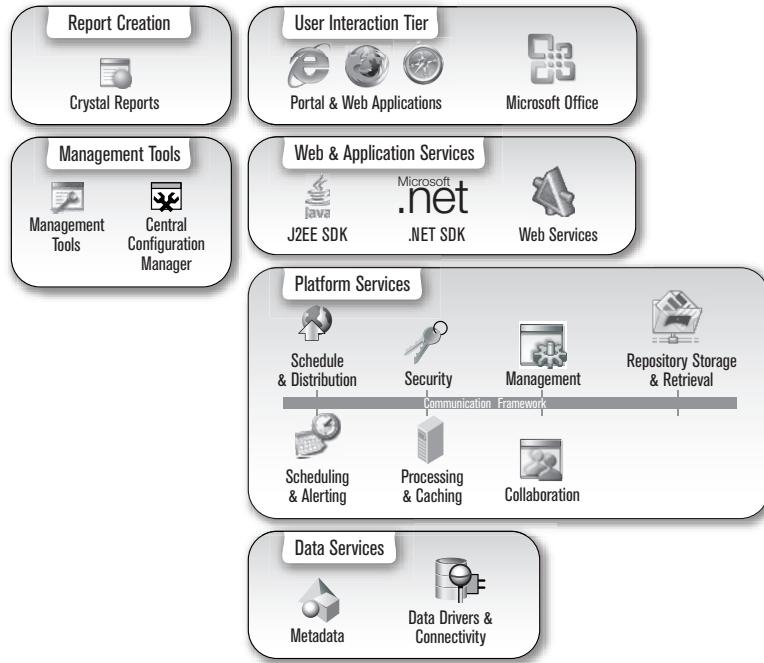


Figure 1. Crystal Reports Server Functional Architecture.

USER INTERACTION TIER

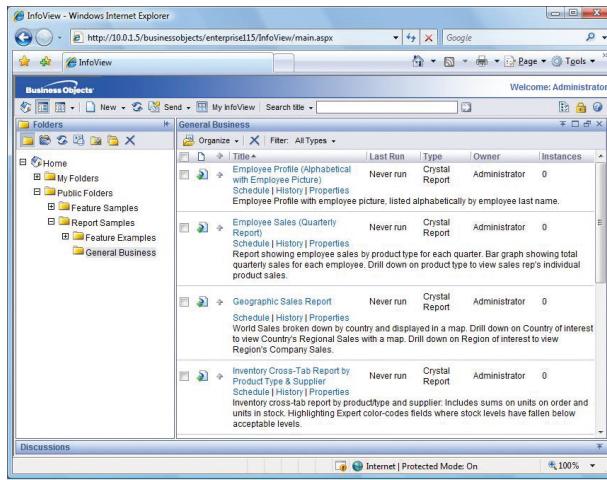


Figure 2. The Infoview portal is included in Crystal Reports Server.

InfoView to Navigate and Organize

InfoView is a complete, production-ready web portal that enables end users to access, view, and interact with Crystal reports (.rpt).

Report consumers use the InfoView website to easily find the reports they need. Users can navigate using an integrated search facility as well as with a folder navigation tree. They can also schedule their own reports to refresh on a regular basis, and manage their history list of previously scheduled reports.

Report Viewers to View, Print, and Export

Within InfoView, you can select your preferred viewer from a choice of thin- and zero-client report viewers: DHTML, Active X viewer, and Java Applet.

These viewers provide end users with simple report viewing and interaction capabilities, including report refreshing, printing, exporting, and searching. InfoView and the report viewers are simple, straightforward, and designed to be used by your end users with minimal training. An offline viewer is also included for disconnected report viewing and interaction.

The new Crystal Reports Viewer XI is fully supported with Crystal Reports Server and is an effective desktop viewer for reports hosted in Crystal Reports Server.

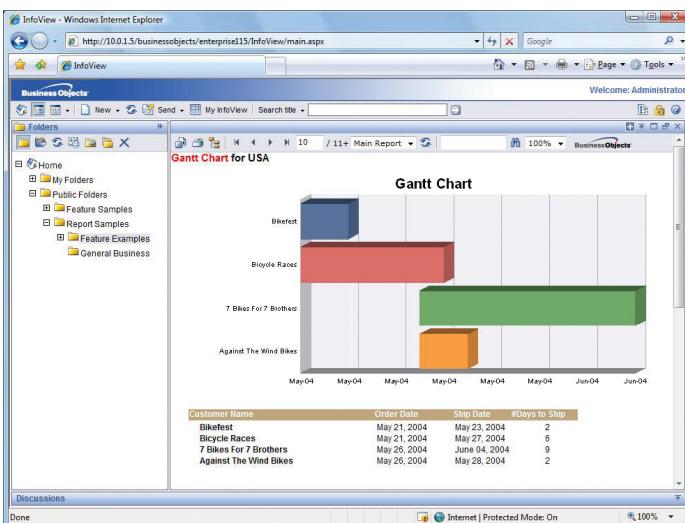


Figure 3. Viewing a Crystal Report within the InfoView portal.

Exporting is a common end-user requirement. Crystal Reports Server supports a variety of exporting formats, including PDF, Excel, and RTF. End users can choose to export a complete report, a specific page or, using the Advanced DHTML viewer, they can export the conditional search results from within a report.

Microsoft Office Integration with Live Office

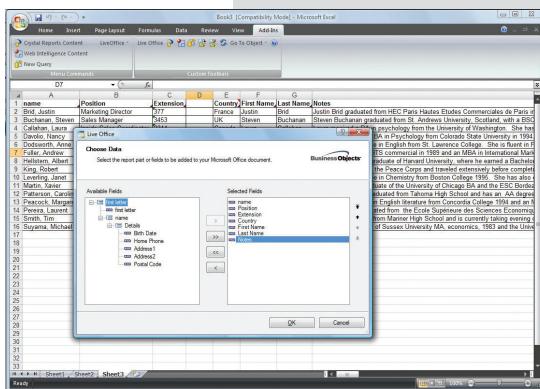
Live Office lets you embed refreshable, verified corporate data—managed by Crystal Reports Server—into your Microsoft Office documents.

With Live Office, your Office documents display data from the same trusted reports you manage in Crystal Reports Server. When everyone uses the same correct source of information, you don't spend time disputing the validity of the data. Instead, everyone focuses on making quicker, more meaningful decisions. With Live Office, you're confident the data you access is timely, consistent, and accurate.

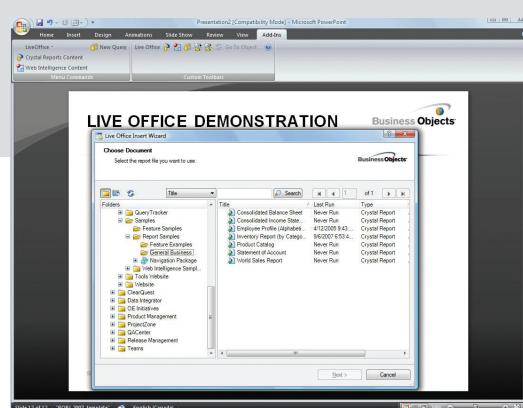
Use Live Office to access live data refreshed from accurate reports. Modify data filters and formulas as needed, while retaining all existing formatting and calculations. Then, automatically refresh a single data item or all the data in your document—all from within Microsoft Office.

Live Office supports the version of Microsoft Office you use today. Office 2000, 2003, XP, and 2007 are supported.

Live Office is architected to use web services to eliminate firewall configuration hassles and reduce client side footprint. It consists of a client-side component that integrates with Microsoft Word, Excel, and PowerPoint. This client-side component communicates with Crystal Reports Server using web services. The Java Web Component Adapter must be used on the server side to communicate with the client. Live Office takes advantage of both the report security and data security that Crystal Reports Server provides. Users must login to Crystal Reports Server through the Live Office client to ensure they are presented a list of reports that they have rights to see. When refreshing data, data level security is also applied, ensuring users see the data they have the rights to see.



Filtering Crystal Reports data from within Microsoft Excel



Navigating Crystal Reports Server Content from within Microsoft Powerpoint

WEB AND APPLICATION SERVICES

Crystal Reports Server includes comprehensive software development kits (SDKs) and portal integration kits to enable flexible integration with existing web environments.

Developer Interfaces

Crystal Reports Server comprises a powerful set of reporting services, exposed through an extensive set of SDKs. All end-user interfaces are built on top of these SDKs, ensuring that developers can access all aspects of the system. These object models encapsulate all the calls needed to:

- Extract content listings from the system
- Control content processing and delivery
- View content
- Interact with content
- Administer the system

All the sample applications included with Crystal Reports Server use this well-documented object model.

J2EE and .NET Services

Crystal Reports Server provides tight integration with Java and Microsoft-based platforms via native Java, Microsoft .NET, and web services SDKs. These kits are made up of robust reporting components, sample applications, and documentation. Developers can install these components on web application platforms, including Microsoft IIS, BEA WebLogic, IBM WebSphere, Apache, Oracle 10g Application Server, or Sun ONE application server. The SDKs provide a high-level application-programming interface (API) to control every aspect of Crystal Reports Server using the development language you prefer.

The components process requests from the users in the presentation tier and then communicate these requests to the appropriate service in the platform tier. The developer services include support for report viewing and logic to understand and direct web requests to the appropriate Crystal Reports Server platform service. Crystal Reports Server uses a Java SDK or a .NET SDK to run the system with a third-party application server, which acts as the gateway between the web server and the rest of Crystal Reports Server. The application server is responsible for processing requests from your browser, sending certain requests to the web component adapter, and using the SDK to interpret components in Java Server Pages (.jsp files) or in Active Server Pages (.aspx files).

Web Services

Crystal Reports Server includes a comprehensive web services SDK that allows developers to integrate documents directly into applications using industry standard technology. It consists of a series of web-based functions that use .NET or J2EE platforms.

Business Objects web services makes it easier and faster to integrate Crystal Reports Server and other Business Objects technology with other web-based applications. It also facilitates the deployment of Crystal Reports Server and BusinessObjects Enterprise with customized applications. Business Objects web services are available for document display, refresh, and providing drill functionality to end users. For developers, the web services provider is deployed on the server side with Crystal Reports Server or BusinessObjects Enterprise services. For developers, the API enables the creation of customized web sites, applications, or web services that access the services in Crystal Reports Server.

Portal Integration Kits

Crystal Reports Server supports integration into industry-leading portal server environments by delivering components with similar functionality to the out-of-the-box, end-user portal InfoView. Prebuilt portal integration kits for SAP, Microsoft Sharepoint, BEA, IBM, and Oracle portals are available for use with Crystal Reports Server. These portal integration kits use portal standards such as JSR-168 and web parts and are available in the Business Objects download center at www.businessobjects.com/products/downloadcenter/xi.asp.

MANAGEMENT TOOLS

To support decentralized management functions, Crystal Reports Server includes a web portal for tasks such as password management, report scheduling, and user-access control. You can customize and automate management tasks using the Crystal Reports Server SDKs.

Central Management Console

For total system control from a single web interface, managing such a broad set of end-user interaction requirements, as well as security and access rights, requires a powerful yet easy-to-use administration environment. Crystal Reports Server includes the central management console (CMC)—a 100% web-based environment for centralized system management, deployment, and configuration. The CMC provides flexible, powerful, and granular control of the environment for tasks that include setting up user roles, security access, server administration, password management, and more. It also allows administrators to easily access and configure the system, while controlling the overall access-rights, applications, and end-user viewing experience.

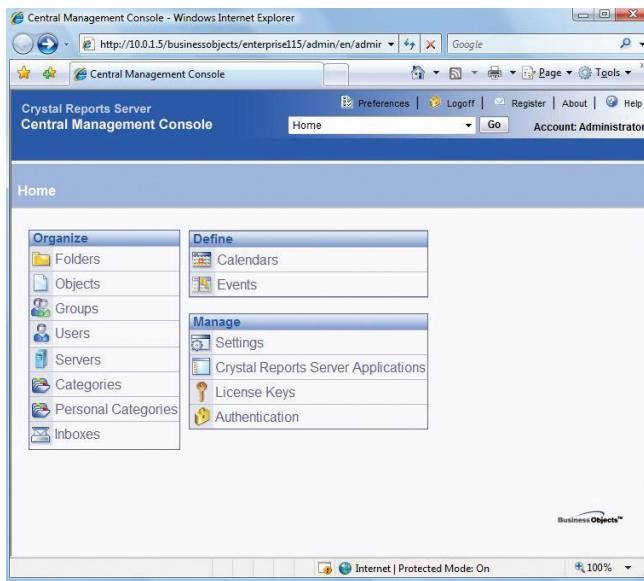


Figure 4. Central Management Console.

IT management and administration benefit from the central repository for all Crystal reports, folders, and user profiles, and access to security entitlement databases for user, role, and document security.

Central Configuration Manager

The central configuration manager (CCM) is designed exclusively for the server management and configuration of the Crystal Reports Server services. This tool allows you to start, stop, enable, and disable servers. It also allows you to view and configure advanced server settings.

PLATFORM SERVICES

Platform Services Overview

Crystal Reports Server is based on the proven platform services of BusinessObjects Enterprise. It represents the services where actual data processing, document processing, and end-user interactivity access takes place. The platform is segmented into a series of specialized services for different tasks and is linked by a highly optimized communication framework. For Crystal Reports Server, these services all run on a single server with up to four processors.

The communication framework handles the movement of information between the platform services and software developer kits (SDKs), and provides end-user information access, delivery, and interaction. You can access individual services via the provided Java, .NET, and web services SDKs, so there is no need to directly access or configure the communication framework.

The platform enables end users to view and interact with information inside and outside the firewall. It allows interactive report viewing, discussion threads for collaborative decision making, and integrated scheduling and distribution of Crystal reports based on events, business calendars, or intervals.

Adding Reports to Crystal Reports Server

Crystal Reports Server is designed to support batch publishing of Crystal reports to the web. Using a desktop publishing wizard, your administrators and end users can publish multiple Crystal reports to Crystal Reports Server. The wizard also lets you configure report processing schedules, security, parameters, and database logons.

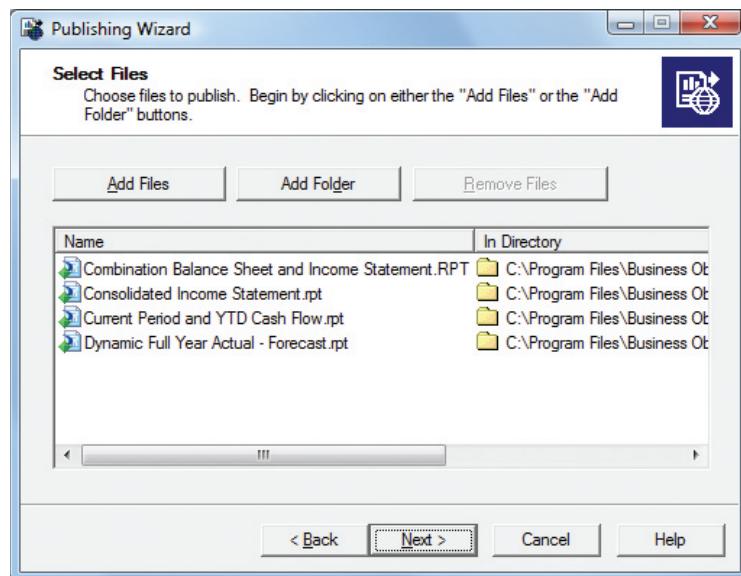


Figure 5. The Publishing Wizard.

Security

Crystal Reports Server can secure access to reports, folders in which they are stored, and the actual data that is visible within the reports. Building on a hierarchical object-level security model, Crystal Reports Server supports security rights at both the folder and object level, and supports full inheritance at the user and group level. Similarly, the product supports aggregation through a flexible, group-user membership model. Data level security is provided by the Business Views semantic layer that provides the innovative View Time Security feature, which secures report data even for scheduled reports.

You can integrate with many third-party security entitlement databases—such as LDAP, Kerberos, Netegrity Siteminder, and Windows NT/Active Directory—and use the information to control user-access rights. The Crystal Reports Server security system maps to these security systems directly. For example, when a user is added to an LDAP group, he or she is automatically added to that same group within the Crystal Reports Server system. When using Microsoft operating systems, Active Directory and Microsoft SQL Server, Crystal Reports Server enables single-signon through to the database for your end users.

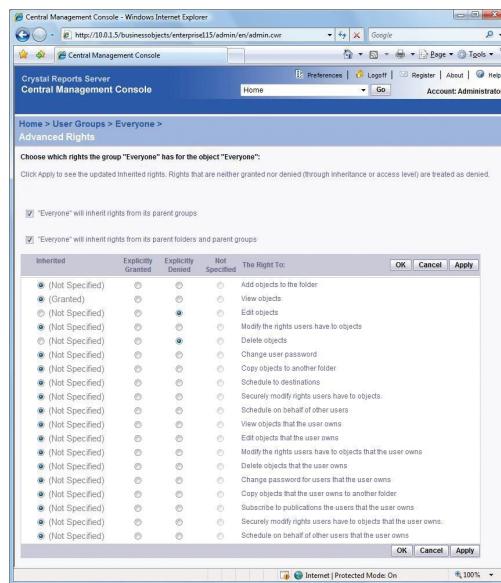


Figure 6. Central Management Console advanced rights window.

In addition, an integrated Crystal Reports Server security system is available for those customers who do not currently use an entitlement database. The system also supports the ability to use more than one entitlement database in the same implementation. This is particularly important in cases where organizations need to combine different audiences. For example, a system might maintain that internal users access the environment using an NT authentication database, while business partner security information is stored in an LDAP database.

System Management

The central management server (CMS) is a key platform service responsible for maintaining a database of information about the Crystal Reports Server system. The CMS data includes information on users and groups, security levels, and reports. This information is used to enforce access rights to Crystal Reports Server and the types of tasks users can perform. The CMS also manages access to the system's report repository database.

Repository, Storage, and Retrieval

Crystal Reports Server stores reports in a central system repository database. Although this repository database stores specific information about the objects published to it—including users, security, groups, folders, and parameters—it does not actually store physical copies of the reports. It contains pointers to the physical reports, thereby making report retrieval faster. The system repository database is maintained either by using the provided MySQL databases, or by using a SQL Server, Oracle, or DB2 database. The database structure can be automatically created when setting up the Crystal Reports Server system or configured on a different database.

Scheduling and Alerting

The report job server provides scheduling capabilities for Crystal Reports. There are many options available including scheduling based on a specified time, a recurring schedule, or even a business calendar. Reports can also be scheduled to output in different formats such as Crystal Reports, Excel, PDF, Word, and text—allowing further interaction. And you can schedule them to different destinations including email, printer, or file server.

You can also combine report scheduling with user role-based security, allowing IT and end users to easily deliver the right information to the people or groups that need it, regardless of whether the users are part of the system.

The scheduler in Crystal Reports Server includes the ability to schedule reports for automatic distribution to external locations, such as .ftp servers, email distribution lists, printers, and file servers. When used in conjunction with security, a single report can be run once and distributed with personalized data for specific individuals or groups.

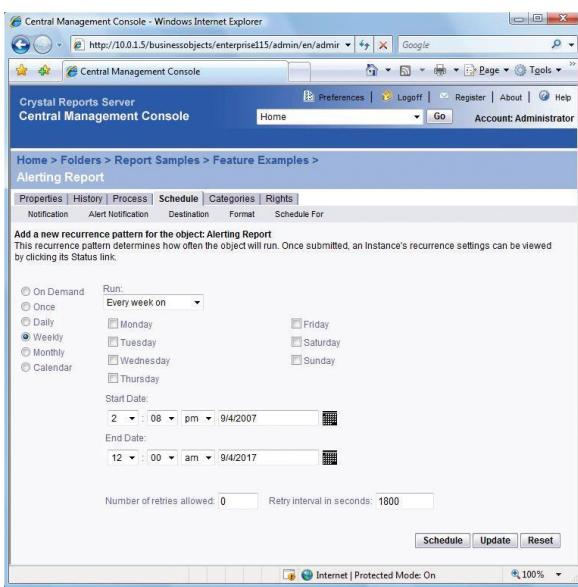


Figure 7. Central Management Console scheduling window.

Processing & Caching

Crystal Reports Server supports efficient report processing through the page server. The page server is primarily responsible for responding to page requests by processing reports and generating them as needed. Only the requested page is returned, not the entire report. This greatly enhances performance and reduces unnecessary network traffic for large reports.

Crystal Reports Server also supports active data sharing. Active data sharing means that in situations where different reports access the same data, the documents can use that shared data and the requested report can be rendered without an additional database hit, even though the other report itself may be different. This results in a significant performance improvement across the entire system, including the database. A major benefit of active data sharing is that as the load and usage increases, more data is cached, and the system runs more efficiently.

The Crystal Reports Server cache server is responsible for handling all report viewing requests. The cache server checks whether or not it can fulfill a request with a cached report page. If it cannot, then it asks the Page Server to generate the page.

Collaboration

Threaded discussions—a fully integrated feature of the InfoView environment—enable users to create and maintain comments on any Crystal report accessible in Crystal Reports Server. The system manages all threaded discussion information and stores it in the repository. Discussion threads can also be made public or private.

REPORT CREATION

The powerful Crystal Reports designer included in Crystal Reports Server is built to address diverse data formatting and presentation requirements. For novice report designers, Crystal Reports includes intuitive wizards, templates, and experts to simplify common reporting tasks. For more advanced users, Crystal Reports includes fine-grained control over most features—including formulas, conditional formatting, and object positioning—to address specific customization requirements. It also includes the powerful Editable Preview feature that allows report designers to edit their report template with data retrieved from the database.

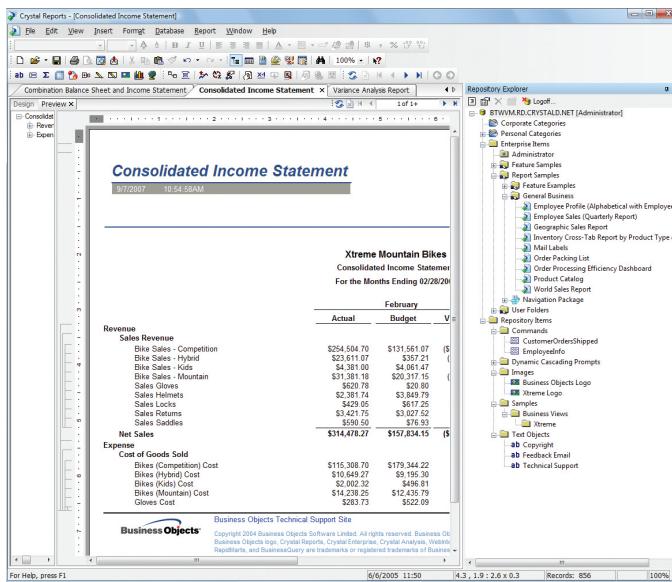


Figure 8. The Repository Explorer within Crystal Reports.

Dynamic, cascading prompts enables end users to select parameter values from a dynamic list populated at run time from a data source. This ensures end users are presented options that are always valid.

The Crystal Reports Server repository provides a secure, central location to store common report elements including custom functions, SQL commands, dynamic cascading prompts, and bitmaps. You can share these components across multiple reports and update them from a single location. Repository objects are managed in the platform tier for secure object sharing and updating.

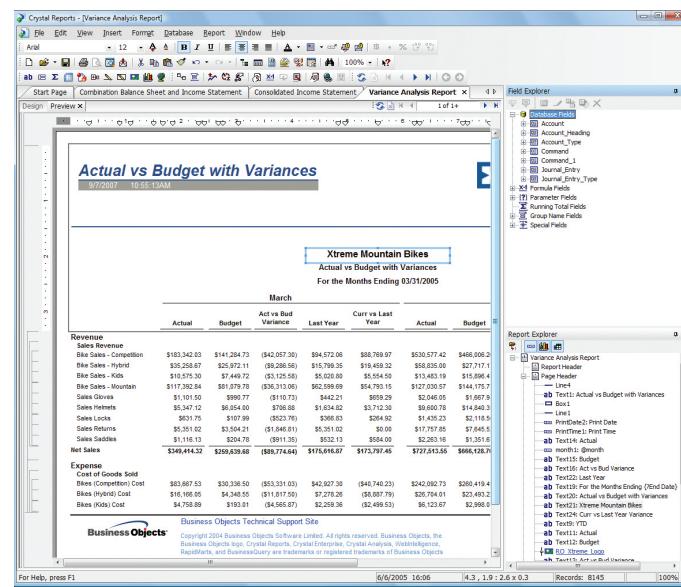


Figure 9. Crystal Reports showing a report, the Field Explorer, and Report Explorer.

DATA SERVICES

The Crystal Reports report designer provides a variety of flexible data connectivity options. By using Business Views, an optional metalayer that masks the complexities associated with data access, you can extend report creation tasks to report designers with less knowledge of the underlying data source.

Data Drivers and Connectivity

Crystal Reports Server includes more than 35 data drivers for direct connectivity to relational, XML, OLAP, and in-memory data. Report authors can choose from native, ODBC, OLE DB, and JDBC connectivity to databases, files, logs, enterprise applications, or program elements. Report authors can also choose to write their own SQL commands. Data from multiple sources can also be joined and synchronized for use in one report.

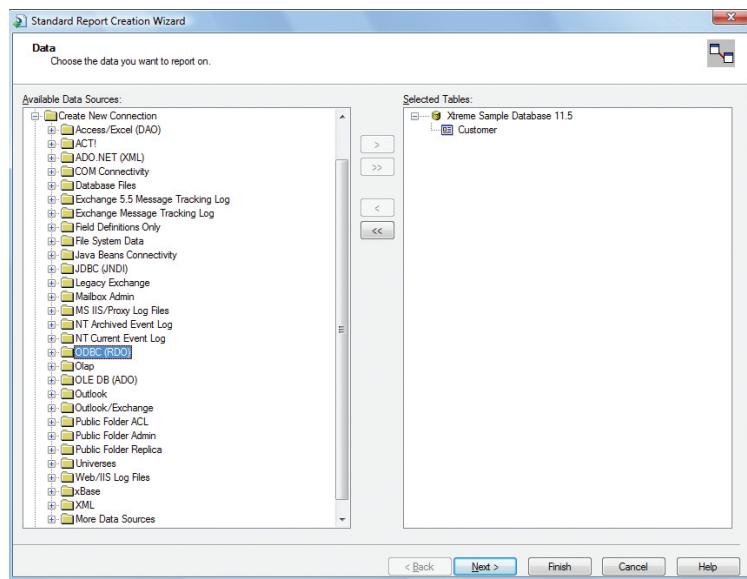


Figure 10. Comprehensive data source access in Crystal Reports.

Metadata

Business Views simplifies data connectivity by creating an abstraction layer over complicated data sources. This accelerates report design and by simplifying data access.

However, Business Views is more than an abstraction layer—it also provides a powerful data security feature called View Time Security. This feature assures that end users see only the data they have the rights to see, even when the report is scheduled.

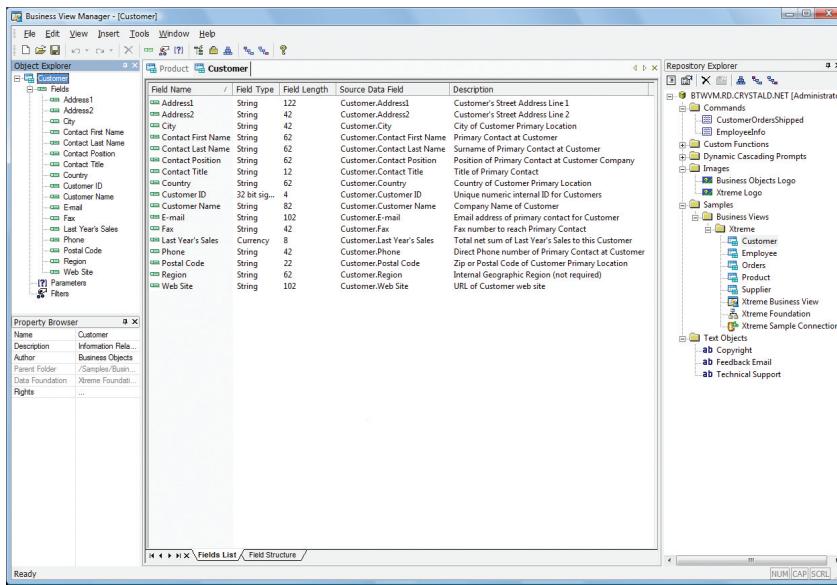


Figure 11. The Business Views Manager metadata layer is included in Crystal Reports Server.

CONCLUSION

Available for deployment on either a Windows or Linux operating system, Crystal Reports Server is a complete reporting solution that helps small to mid-sized organizations create, manage, and deliver reports via the web or through Microsoft Office. It is built using the proven, trusted BusinessObjects Enterprise platform, providing a powerful services-oriented architecture that is ideal for reporting. Plus, it includes Crystal Reports XI and Live Office for integration with Microsoft Word, Excel, and PowerPoint. Regardless of the reporting challenge, small and medium-sized organizations can benefit from using Crystal Reports to address the complete reporting process, and convert your data into valuable information—wherever your users choose to work.

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