White Paper

Crystal Reports Server XI Functional Overview

Business Objects™

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Audience: IT

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Executive Summary

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

This paper provides a technical overview of Crystal Reports Server XI. It outlines the overall components, services, and capabilities included in Crystal Reports Server to address the complete reporting process: from data access and report design, to report management and delivery, to report integration with portals and enterprise applications. Additional installation and system management information is included in the documentation available with Crystal Reports Server.

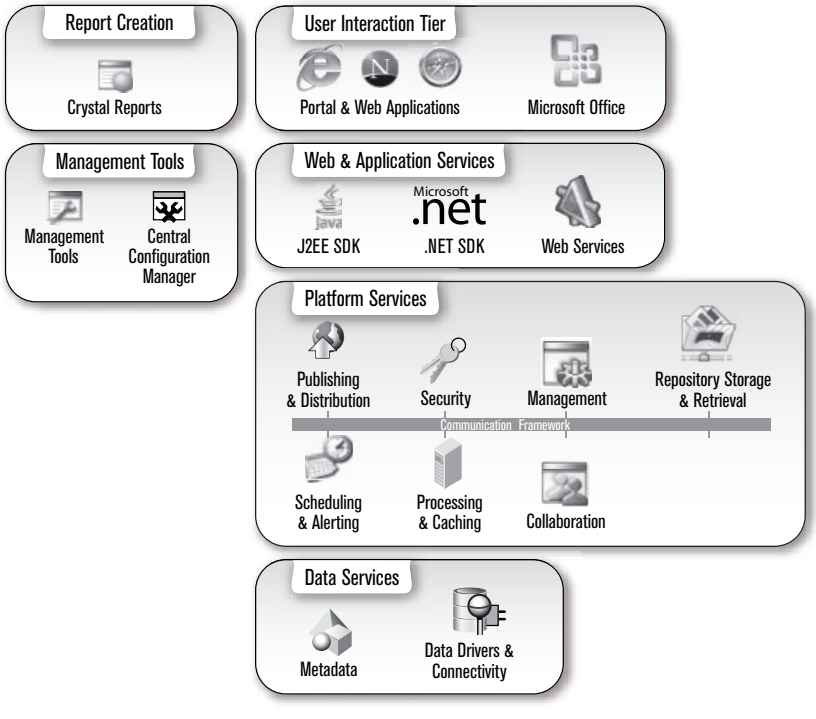
Crystal Reports Server: Functional Overview

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, Web Intelligence, OLAP Intelligence, Performance Manager, and Dashboard Manager. BusinessObjects Enterprise also includes data integration capabilities from Data Integrator. It is architected using modern web standards with an industry-standard communication framework to tie all the components and services together.

Crystal Reports Server harnesses the reporting services and components of the BusinessObjects Enterprise architecture to offer small and medium 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.

Crystal Reports Server Functional Architecture

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

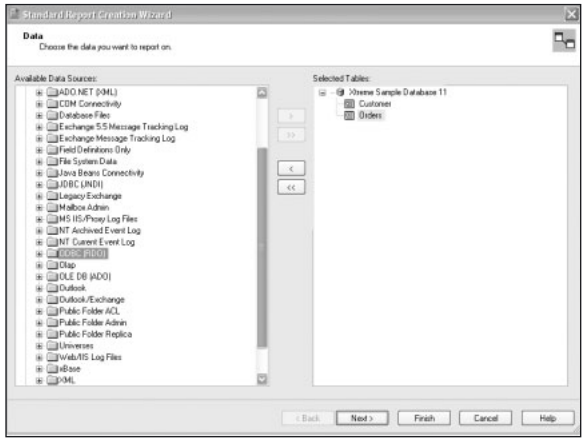


- ►Data services for comprehensive and flexible data access
- ►Creation tool for flexible data formatting using Crystal Reports
- ►Platform services for report publishing, security, and processing
- ►Management tools for managing Crystal Reports Server services and objects
- ►Web and application services for customized report integration with portals and applications
- ►User interaction tier for end-user report viewing and interaction

Data Services: Comprehensive and Flexible Data Access

Crystal Reports Server includes the industry-standard report creation tool, Crystal Reports. Crystal Reports provides a windows-based report designer with a variety of flexible data connectivity options. By creating business views, an optional meta layer that masks the complexities associated with data access, you can extend report creation to users with less data expertise.

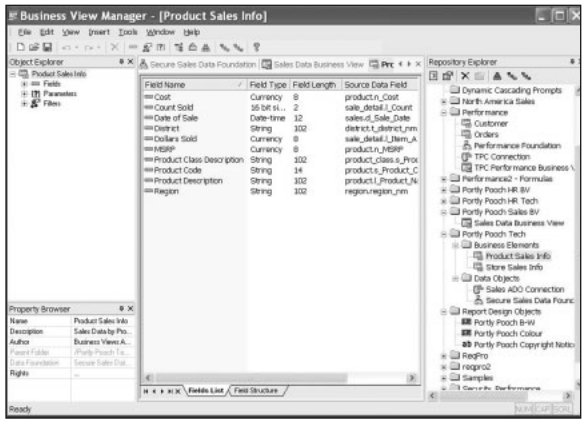
Data Drivers and Connectivity



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. For more flexible control over how the data is queried, 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.

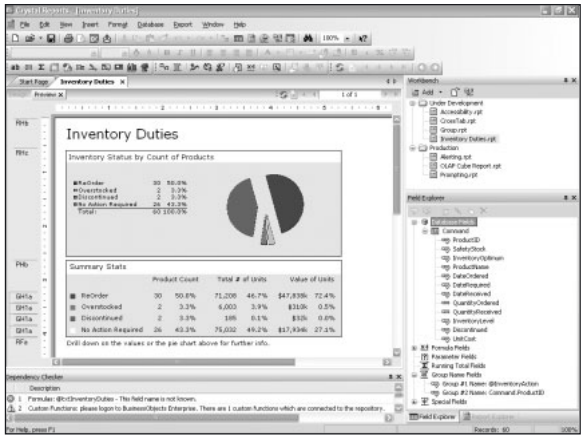
Crystal Reports Server also supports Unicode. This means that data stored in almost any language can be accessed and presented within a single report.

Metadata



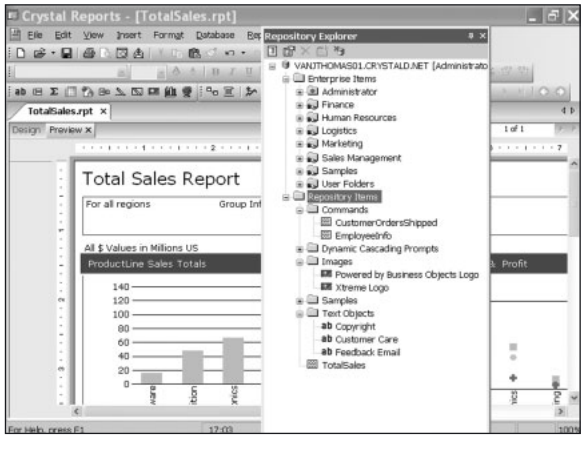
Business Views, a feature of Crystal Reports Server, allow you to simplify data connectivity and reduce the number of unique reports required. Business Views allow you to create a user-friendly data abstraction layer that masks data complexity, by separating data connections, data access, business elements, and the overall business definition, making it easier to manage data as part of the reporting process. Used in conjunction with the security in Crystal Reports Server, Business Views allow authentication information to be shared throughout report objects. Because data-level security can be implemented on individual reports, the number of reports required to support unique end-user demands can be significantly reduced.

Report Creation: Flexible Data Formatting with Crystal Reports



The powerful Crystal Reports designer included in Crystal Reports Server is built to address diverse data formatting and presentation requirements. For novice users, Crystal Reports includes an intuitive report design expert and object-oriented explorers to simplify common reporting tasks. For more advanced users, Crystal Reports includes fine-grain control over most features, including formulas, conditional formatting, and object positioning, to address specific customization requirements. Plus, WYSIWYG design support allows report authors to simultaneously format a report while previewing it within the designer.

Crystal Reports Server also helps address the challenges associated with high volume report design and maintenance. For example, the dynamic cascading prompts feature helps minimize report volume by dynamically rendering parameter pick lists based on up-to-date database content. The key benefit of having predefined and scheduled value lists is that the report does not have to query the database to gather the prompts every time a user requests a specific view of a report.



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. The repository explorer in the Crystal Reports designer allows report authors to log on to a repository server in the platform tier. Repository objects are managed in the platform tier for secure object sharing and updating.

For more information on Crystal Reports data access and design capabilities, please read the "Crystal Reports XI: Report Design Whitepaper" located at: www.businessobjects.com/global/pdf/whitepapers/crxi_reportdesign_wp.pdf.

Platform Services: Report Publishing, Security, and Processing

Platform Services Overview

Crystal Reports Server is based on the proven platform services of BusinessObjects Enterprise. The platform services tier is often referred to as the intelligence and processing tier. It represents the services where actual data processing, document processing, and end-user interactivity access takes place.

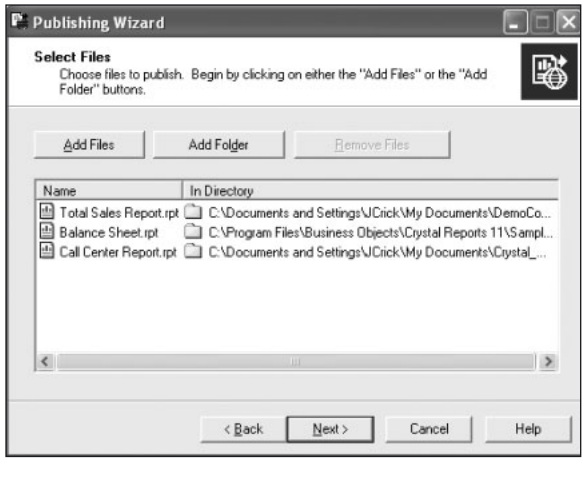
The platform is segmented into a series of specialized services for different tasks and is linked by a highly-optimized communication framework. For Crystal Reports Server, these individual platform services can be run from a single processor with up to four processors on the same machine. Crystal Reports Server is available for deployment on Windows, Red Hat Enterprise Linux 3, or SuSE Linux Enterprise Server platforms.

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, COM, and web services SDKs so there is no need to directly access or configure the communication framework. This communication framework is built on proven application technology and is designed as a pluggable or extensible platform to add, customize, or remove services as required for specific deployments.

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.

Publishing and Distribution

Crystal Reports Server is designed to support batch publishing of Crystal reports to the web. Using a desktop publishing wizard, administrators and end users can simultaneously publish multiple Crystal reports to Crystal Reports Server. The wizard also lets you configure report processing schedules, security, parameters, and database logons. By assigning object rights to folders in Crystal Reports Server, you control who can publish reports and where they can publish them to.

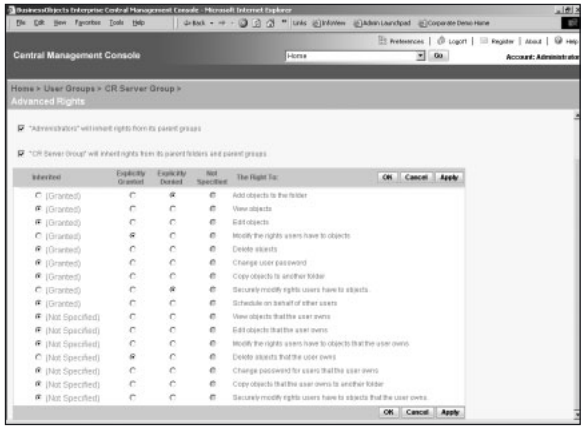


You can also use the publishing wizard to update reports using previous versions of Crystal Reports. Published reports are then automatically converted to the Crystal Reports XI format when run using Crystal Reports Server. You can then open and modify the resulting XI reports in the Crystal Reports XI designer.

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.

Security



You can use Crystal Reports Server to manage security and user-access rights. These are often critical elements of a modern reporting system. Building on a hierarchical object-level security model, Crystal Reports Server enables the application of 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 also available with the metadata tool, business views, which is available as part of Crystal Reports Server.

A wizard-driven interface lets security administrators access third-party security entitlement database—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.

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.

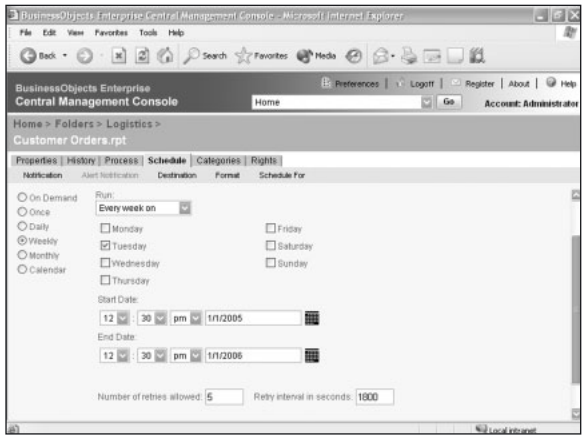
Repository, Storage, and Retrieval

Crystal Reports Server stores reports, report instances, and discussion threads 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 MSDE or MySQL databases, or by using a preferred 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 predefined 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.

Processing

Crystal Reports Server supports efficient report processing through use of a page server. The page server is primarily responsible for responding to page requests by processing reports and generating encapsulated page format (EPF) pages. The key benefit of EPF is that it supports page-on-demand access so that only the requested page is returned, not the entire report. This greatly enhances performance and reduces unnecessary network traffic for large reports.

Caching

Crystal Reports Server uses a cache server to help minimize database hits and increase report processing and presentation efficiencies. The 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 before it requests new data from the database. For example, if the cache server finds a previously viewed page that has been stored with exactly the requested data, it returns that cached report page instead of retrieving the duplicate data.

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.

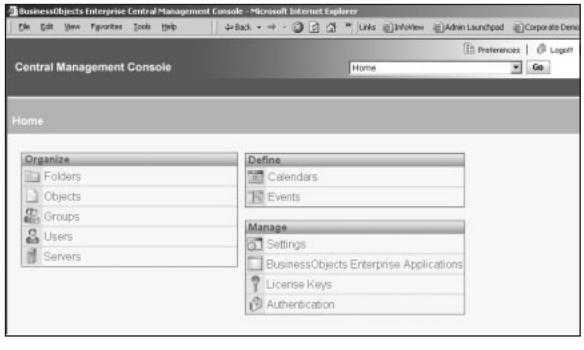
Collaboration

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.

Management Tools: Services and Object Management

Crystal Reports Server includes a series of dedicated, preconfigured platform management services for tasks such as password management, report scheduling, and user access control to support decentralized management functions. Management tasks can be customized and automated using the Crystal Reports Server SDKs.

Central Management Console



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—for total system control from a single web interface. Crystal Reports Server includes the central management console (CMC)—a 100% .NET or Java 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.

The Crystal Reports Server end-user administration and management tools are built using the developer SDKs. The CMC is included for full control over the environment. IT management and administration benefit from the central repository for all Crystal reports, folders, and users profiles, 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.

Web and Application Services: Customized Report Integration with Portals and Applications

Built using a modern services-oriented architecture, Crystal Reports Server includes comprehensive SDKs and portal integration kits to enable flexible integration with existing web environments.

Developer Interfaces

Crystal Reports Server is comprised of 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, and administer the system. And 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 J2EE, 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 BEA WebLogic, IBM WebSphere, Apache, Oracle 10g Application Server, Sun ONE application server, or Microsoft IIS. The SDKs provide a high-level API to control every aspect of Crystal Reports Server using the developer language of choice.

The developer services layer hosts the server-side components and act as the translation layer between the end user and Crystal Reports Server. 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. The application server 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 and BusinessObjects Enterprise.

The application server also supports the InfoView portal and uses the SDKs to convert documents managed by Crystal Reports Server into HTML format when users view pages.

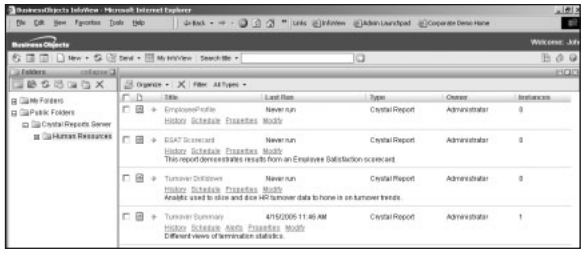
Portal Integration Kits

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 will be available for use with Crystal Reports Server. These portal integration kits use portal standards such as JSR-168 and web parts and will be available in the Business Objects download center at: www.businessobjects.com/products/downloadcenter/xi.asp.

User Interaction Tier: End-User Report Viewing and Interaction

InfoView

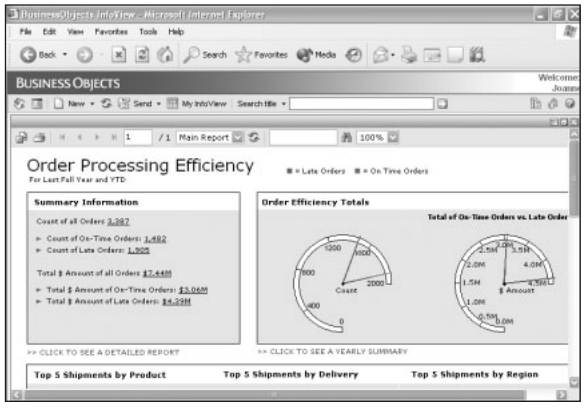
Available in Java and .NET, InfoView is a customizable web portal that enables end users to access, view, and interact with Crystal reports (.rpt). InfoView is built using the same set of portal integration components described in the previous section.



InfoView is a central web environment that allows end users to easily find the reports they need. Users can navigate using an integrated search facility as well as with a folder navigation tree. Within the InfoView zero-client web environment, users can personalize their experience by customizing the folder or report they want to view when they login, choose their preferred language, and the level of interaction for different information.

A historical listing of previously generated reports can also be exposed to end users from within InfoView. This is often useful for end users who need to look at data based on a specific point in time. Historical instances also reduce redundant report processing volumes.

Report Viewers



Crystal Reports Server offers a choice of thin- and zero-client report viewers: Java viewer, Active X viewer, DHTML viewer, and Advanced DHTML viewer. These viewers provide end users with a variety of report viewing and interaction capabilities including report refreshing, printing, exporting, and searching. You can also customize the viewers as well as set them up to launch within the InfoView window or in a separate window. An offline viewer is also included for disconnected report viewing and interaction.

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

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 businesses create, manage, and deliver reports via the web or embedded in enterprise applications. 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, the industry-standard report authoring tool. Regardless of the reporting challenge, small and medium-sized organizations can benefit from using Crystal Reports to address the complete reporting process: from data access and report design, to report management and delivery, to report integration with portals and enterprise applications.

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PT# WP3002-C

Printed in the United States – September 2005.