

Crystal Enterprise™ 10 Getting Started Guide

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Welcome to Crystal Enterprise

1

This chapter briefly describes Crystal Enterprise and outlines the contents and the intended audience of this *Getting Started Guide*. Product registration and technical support information is also included, along with a brief description of the document conventions used within this guide.

What is Crystal Enterprise?

Crystal Enterprise is a flexible, scalable, and reliable solution for delivering powerful, interactive reports to end users via any web application—intranet, extranet, Internet or corporate portal. Whether it is used for distributing weekly sales reports, providing customers with personalized service offerings, or integrating critical information into corporate portals, Crystal Enterprise delivers tangible benefits that extend across and beyond the organization. As an integrated suite for reporting, analysis, and information delivery, Crystal Enterprise provides a solution for increasing end-user productivity and reducing administrative efforts.

Who should use this guide?

This guide is intended for anyone who wants to get Crystal Enterprise up and running quickly. Common tasks and general overviews are provided throughout for users and administrators who are new to Crystal Enterprise. If you are evaluating Crystal Enterprise, this guide should provide you with a useful introduction to the product's general features and functionality. You'll learn the basics of how to install, how to add users and reports to the system, and how to view reports in Crystal Enterprise.

For more information about the product, consult the *Crystal Enterprise Administrator's Guide*, the *Crystal Enterprise Installation Guide*, and the *Crystal Enterprise User's Guide*. Online versions of these guides are included in the doc directory of your product distribution. Once you install Crystal Enterprise, they are also accessible from the Crystal Enterprise Launchpad, along with the Web Developer's Guides.

About this guide

This guide provides you with basic installation information and serves as a general introduction to Crystal Enterprise, the Crystal Management Console, the Crystal Publishing Wizard, and the overall product architecture.

Chapter contents

The following list provides a short description of each of the remaining chapters in this guide.

Chapter 2: What's New in Crystal Enterprise

Crystal Enterprise 10 continues to extend the market-leading scalability, reliability, and flexibility of the Crystal Enterprise system, cementing it firmly as a premium enterprise reporting system. Crystal Enterprise 10 delivers significant productivity gains across enterprise reporting deployments, by helping both IT and end users use the system more effectively. This chapter provides a high-level overview of new features and enhancements.

Chapter 3: Planning Your Installation

This chapter provides general details about performing a preliminary installation of Crystal Enterprise in a Windows environment. It also provides details about performing a preliminary installation in a UNIX environment. For complete installation procedures, consult the *Crystal Enterprise Installation Guide* (`install.pdf`) included with your product distribution.

Chapter 4: Using Crystal Enterprise

This chapter serves as an introduction to working with Crystal Enterprise and viewing reports with the Crystal Report Viewer.

Chapter 5: Managing Accounts

This chapter focuses on the Crystal Management Console and provides you with information about how to create and change user accounts.

Chapter 6: Publishing Objects to Crystal Enterprise

This chapter focuses on the publishing process: it introduces the Crystal Publishing Wizard and tells you how you can use it to add Crystal reports and other objects to the Crystal Enterprise web desktop or to your custom web desktop; it also describes alternative ways of adding objects to the Crystal Enterprise environment.

Chapter 7: Crystal Enterprise Architecture

This chapter provides an overview of the Crystal Enterprise architecture, describes the different components, and identifies how they work together to distribute reports over the web.

Online help

Access the online help in Crystal Enterprise by clicking Help. The online help contains all of the information found in this guide.

Product registration

There are several ways you can register your product:

- Fill out the Product Registration form on the Crystal Decisions web site at: <http://www.crystaldecisions.com/register/>
- Print the Product Registration form and fax it to the registration fax number closest to you. Crystal Decisions will then fax you a registration number that can be entered into the product the next time you use it.

Registration fax numbers

USA/Canada +1 (604) 681-5147
United Kingdom +44 (0) 20 8231 0601
Australia +6 2 9955 7682
Germany +49 (0) 69 9509 6182
Hong Kong +852 2893 2727
Singapore +65 777 8786

Registering the product ensures that you are kept up-to-date with product advancements.

Customer Handbook

For the latest details about product registration, maintenance, support, and services, visit our web site and download the Customer Handbook that corresponds to your region:

- North America:
<http://www.crystaldecisions.com/about/loyalty/handbook.asp> (English)
- Europe:
<http://www.crystaldecisions.com/about/loyalty/handbook.asp> (English)
<http://germany.crystaldecisions.com/about/loyalty/handbook.asp>
(German)
<http://france.crystaldecisions.com/about/loyalty/handbook.asp> (French)

If a Crystal Decisions Customer Handbook is not available for your region, please refer to the rest of this Welcome chapter, or contact your sales or support representative for complete details

Crystal Care technical support

For information on accessing your Crystal Care support specialists, contact the technical support administrative team, your sales representative, or the regional office nearest you. Contact details are available at:

<http://www.crystaldecisions.com/contact/offices.asp>

To find out about the technical support programs available for Crystal Enterprise:

- Go to our support web site at:
<http://support.crystaldecisions.com/crystalcare/>
- Contact your regional office. For details, go to:
<http://www.crystaldecisions.com/contact/offices.asp>

Crystal Training

Whether you're a developer, information technology professional, or business user, we offer a wide range of Crystal Enterprise training courses designed to build or enhance your existing skills. Courses are available online, at certified training centers, or at your own site:

- For a complete list of training courses and special offers, visit:
<http://www.crystaldecisions.com/training/>
- Or contact your regional office. For details, go to:
<http://www.crystaldecisions.com/offices/>

Crystal Consulting

Our global team of certified consultants and consulting partners can guide you through a corporate-wide solution—including strategy, design, integration and deployment—for the fastest results, maximum performance, and increased productivity.

- To learn more, visit:
<http://www.crystaldecisions.com/consulting/>
- Or contact your regional office. For details, go to:
<http://www.crystaldecisions.com/offices/>

Document conventions

This guide uses the following conventions:

- **Commands and buttons**
For easy recognition within procedures, User Interface (UI) features appear in bold type. For example: On the **File** menu, click **New**.
- **Keyboard shortcuts**
Delete means the Delete key, or the Del key on your numeric keypad. Enter means the Enter, Return, or CR key, depending on which of these keys appears on your keyboard.
- **Key combinations**
CTRL+KEY, SHIFT+KEY, and ALT+KEY are examples of key combinations. Hold down the first key in the combination and, at the same time, press the second key in the combination (designated above as KEY). For example: CTRL+C means hold the Control key down and press the letter C on your keyboard (CTRL+C is the Windows Copy command).
- **Key terms are italicized when first defined.**
- **Monospaced font indicates data that you enter using your keyboard.** For example: In the Formula Editor, type `If Sales > 1000 Then crRed`
- **Monospaced, italicized font indicates variable data that you must replace with data appropriate to your current settings, environment, or task.** For example, in the following URL, you would replace *webserver*

`http://webserver/crystal/enterprise/`

Crystal Enterprise 10 extends the robust information infrastructure provided by earlier versions of Crystal Enterprise. Crystal Enterprise 10 brings together features from across the Crystal product line to meet the diverse needs of users, from presentation-quality reporting to in-depth data analysis. This includes a variety of major enhancements spread across our data access methods, administration capabilities, and report design options. This chapter provides a high level overview of the new features and enhancements as they pertain to end-users, report designers, developers, and IT professionals.

End-user experience

Crystal Enterprise 10 brings powerful analytic reporting tasks and capabilities to the average business user. Power users and analysts can also use Crystal Enterprise as a central repository for accessing accurate data to conduct analyses, to create spreadsheets and presentation-quality reports, and to share information across the enterprise.

Microsoft Office integration

Crystal Enterprise 10 provides a range of integration points with the Microsoft Office system. To complement the Excel Add-In for Crystal Enterprise, Crystal Enterprise 10 can store and manage Excel, Word, and PowerPoint files. This allows you to associate background information, proposals, and other documents with existing reports in the Crystal Enterprise system, providing a single source for information on various projects.

Ad Hoc reporting and analysis

Crystal Enterprise 10 provides a broad range of interactive reporting and analysis capabilities. These capabilities are available through updated out-of-the-box tools and our Smart Reporting Software Development Kit (SDK), which allows custom development.

Scheduling

The Crystal Enterprise 10 web interfaces have been updated to increase usability and accessibility. Common operations, such as scheduling and printing, have been simplified with the introduction of new features, such as calendars and DHTML printing.

- **Calendars**

Calendars simplify scheduling. You can now run reports based on predefined calendars that include key business events, such as the close of quarter, holidays, and data warehouse refresh days. This eliminates the complex data and time selections that are often required to set up recurring jobs. For example, you might want to schedule a report to run on the first morning of each week. Because of holidays, this event might fall on a Monday, Tuesday, or even Wednesday. Rather than scheduling each instance of the report individually, or manually selecting the run days, you can set the report to run against a business calendar that provides a pre-defined schedule of run days.

- **Notification**

You can now set scheduling options that automatically send notification when an object instance succeeds or fails. For example, you may have a large number of reports that run a new instance every day. You need to check each instance to make sure it ran properly, and then send out emails to the users who need to know that the new report is available. With thousands of reports, it would take too much time to manually check the reports and contact the users who need the

information. Using notification settings in Crystal Enterprise, you can set each object to automatically notify you when the report fails to run properly, and you can automatically inform users when new report instances run successfully.

Report design

Crystal Enterprise 10 provides greater fluidity between reports and between data sources through the new Crystal Business Views, through the Crystal Repository, and through new report navigation features.

Simplified data access

Crystal Business Views, a new feature of Crystal Enterprise 10, offers a new data abstraction layer that simplifies the process of connecting to enterprise data sources. This new central data access model exposes predefined, domain-specific data sources, which reduces the need for complex joins, filters, or formulas within individual report designs. Using Crystal Enterprise, you can integrate data from disparate sources. You can also bring together data from multiple data collection platforms and application boundaries so that the differences in data resolution, coverage, and structure between collection methods are eliminated.

Integrated report component repository

Through the Crystal Repository, Crystal Business Views also provides centralized access to common report components, which makes it easier to share useful components with other report designers. You store these components in the Crystal Repository through Crystal Enterprise and access them through either the Crystal Reports designer or through Crystal Business Views.

Report hyperlinking

You can use hyperlinks in Crystal reports (RPT and CAR files) to tie together information on multiple reports and to enhance navigation for end users. These hyperlinks pass data context, allowing you to specify a dynamic path between two specific pieces of information. This functionality is implemented as a Hyperlink in Crystal Reports and as an Action in Crystal Analysis. You can use Hyperlinks to link between reports published to an object package in Crystal Enterprise, or to a specific instance of a report stored in the object history. Use Actions in Crystal Analysis reports to link between Crystal reports and to other key information.

Developer flexibility

Crystal Enterprise 10 allows you, the developer, to take advantage of the powerful capabilities Crystal Enterprise platform with minimal coding or application redesign. New features accelerate the process of creating new applications and they provide a more seamless migration of application built on small components of the Crystal Enterprise platform.

.NET Server Controls

The .NET Server Controls allow you to rapidly incorporate content and functionality from Crystal Enterprise into Microsoft Visual Studio.NET applications. Crystal Enterprise 10 provides visual and non-visual controls that contain the logic for common operations, such as authentication, folder listing, and report viewing. You can manipulate these controls in the Visual Studio.NET environment and insert them seamlessly into applications.

Application migration and upsizing

You can use Crystal Enterprise 10 to centralize and scale existing stand-alone applications created using the products from the Crystal family. Available in the Report Application Server (RAS) and Crystal Reports for Visual Studio.NET Server, a new feature allows you to easily upsize applications to run on a full Crystal Enterprise deployment with multiple servers.

System administration

Crystal Enterprise 10 helps administrators streamline system management by delegating tasks and automating regular operations. Crystal Enterprise 10 also provides cross-platform support, comprehensive data management, and detailed usage auditing capabilities.

Security

Crystal Enterprise 10 extends Active Directory and LDAP functionality to support a broader set of security scenarios.

- **Active Directory (native mode)**
Active Directory support allows you to authenticate Crystal Enterprise users against an Active Directory server. You can also map Active Directory users and groups to Crystal Enterprise, simultaneously implementing object, folder, and data-level security.
- **LDAP (secure socket layer)**
The extension of LDAP support in Crystal Enterprise 10 provides a secure channel for communication between Crystal Enterprise and a directory server, through which all authentication and authorization requests between Crystal Enterprise and the LDAP server flow. This feature supports both server authentication and mutual authentication.

Object Management

Crystal Enterprise 10 increases your ability to centralize critical information and distribute it consistently to users. Crystal Enterprise 10 allows you to manage and secure a broad range of information and objects, including spreadsheets, text files,

programs, reports, and hyperlinks. An updated publishing tool and a new object packaging feature round out this broad set of object management capabilities.

- **Hyperlink Objects**

Hyperlink objects provide a standard mechanism for accessing information from external systems. You can use these objects to provide a URL connection to legacy reports, web services, or other information resources hosted in third party systems, and you can apply Crystal Enterprise security to these objects. This allows customers to standardize on managing relevant business intelligence content in Crystal Enterprise—delivering and securing the content in a common interface.

- **Object packages**

Object packages simplify administration by allowing you to schedule, secure and manage a set of related reports and programs as a single object. This ensures that each instance of a package provides a consistent and synchronized snapshot of a set of related data. The new managed report navigation feature provides a means to link reports in an object package so that end users can easily move between related report instances.

- **Third party object support**

The third party object support available in Crystal Enterprise 10 allows you to distribute additional information associated with core operational reports (for example, closely related documents or legacy reports). With the Crystal Enterprise 10 security model and user interface you can distribute Microsoft Word, Microsoft PowerPoint, Microsoft Excel, Adobe Acrobat, rich text, text, and program files.

- **Unified Publishing Wizard**

The Crystal Enterprise 10 Publishing Wizard allows you to publish a number of objects, such as reports, Microsoft Office documents, and other files, to Crystal Enterprise simultaneously.

System Management

Crystal Enterprise 10 allows you to decentralize the administration of large deployments, for example you can delegate or automate specific tasks. Additionally, you can use the new auditing capabilities to monitor system usage.

- **Delegated administration**

Delegated administration allows you, the system administrator, to distribute administration tasks to application administrators or IT resources in specific business units. The IT group can configure the system and ensure server health, while each business unit gains responsibility for object management and security. While in previous versions of Crystal Enterprise, delegated administration capabilities were available only through the Software Development Kit (SDK), Crystal Enterprise 10 directly exposes these capabilities in its primary management tool, the Crystal Management Console (CMC).

Delegated administration is based on three types of Crystal Enterprise administrators:

- **Global administrators**
A global administrator manages the entire Crystal Enterprise deployment. This person can assign specific users and groups to be managed by specific application administrators.
- **Application administrators**
An application administrator can manage folders, reports, and cubes for specific business unit, but cannot see objects of other business units. An application administrator can implement an application-level security model by assigning users and groups to objects.
- **Server administrators**
A server administrator can manage the addition, removal, and/or modification of Crystal Enterprise servers.
- **Notification**
Notification is an object-level trigger, primarily designed to help you catch critical job failures or notify users when new information is available. Based on the success or failure of an individual object instance, you can send notification via:
 - An email to an administrator, the object owner, or other users.
 - An event that triggers a program or report object to run.
 - An audit file, stored in the Crystal Enterprise auditing database.
- **Program objects**
Program objects are executables, scripts, or Java programs that you can schedule to run regularly or based on an event. Crystal Enterprise 10's new program object features allow you to automate a wide range of administrative tasks, making Crystal Enterprise a self-managing environment. Additionally, you can use program objects to trigger external processes, thus integrating Crystal Enterprise into a broader work flow.
The following is an example of how program objects can be incorporated into the administration of a Crystal Enterprise system:
A reconciliation process runs nightly and populates a database. On completion, a file—`nightlybatch.txt`—is created, with a batch number. A file event in Crystal Enterprise detects the file creation and runs five reports against the reconciliation data from that night. The completion of these five report jobs triggers a program object. This program object runs a script that moves `nightlybatch.txt` to another directory, which launches another process in another system.
- **Auditing**
New auditing capabilities in Crystal Enterprise 10 provide you, the administrator, with a detailed historical view of user and object interaction, and of system usage. This allows you to fine-tune system performance, retire unused reports, and provide business units with a comprehensive snapshot of their usage patterns. Servers in Crystal Enterprise are now designed to record pertinent statistical metrics to an auditing database. (System administrators specify whether or not

to audit metrics and the time interval of the audit for each server.) The auditing cache file is periodically passed to the Crystal Management Server (CMS), where the auditing sub-system maintains a database that stores the information. You can compile and present this data using performance sample audit reports, supplied with Crystal Enterprise or your own custom Crystal report.

Data access, security and management

Crystal Business Views, a metadata service that is part of Crystal Enterprise 10, allows you to better manage reporting across multiple data sources. You can efficiently abstract and organize data for end-users, while managing query efficiency and data-level security. Additionally, Crystal Business Views facilitates the migration of reports between various versions of an underlying database, for example, development, testing, and production databases.

Platform support

Crystal Enterprise 10 allows flexibility in choice of operating systems, platforms, and programming languages, based on individual application requirements. This ensures that each business unit or application use its existing resources most efficiently.

- **Operating systems**

Crystal Enterprise 10 provides comprehensive support for all server functions—including reporting and analysis—on Microsoft Windows, Sun Solaris, and IBM AIX. You can deploy Crystal Enterprise 10 across any mixture of these platforms to meet the specific needs of various business units or applications.

- **Crystal Enterprise web desktop**

Crystal Enterprise's standard web interface now supports both COM and Java environments.

This chapter provides general details about performing a preliminary installation of Crystal Enterprise in a Windows or a UNIX environment. For complete installation procedures, consult the *Crystal Enterprise Installation Guide* (`install.pdf`) included with your product distribution.

Installation overview

Crystal Enterprise offers a completely customizable and scalable solution by providing a number of distinct client and server components that can be distributed in various ways across a number of machines. However, for the purposes of this introductory guide, the product's diverse components are grouped together as "Crystal Enterprise" and treated whenever possible as a single application.

This chapter recommends several preliminary installation scenarios that enable you to get Crystal Enterprise up and running quickly. The scenarios described here are ideal for individuals and organizations who are interested in familiarizing themselves with the features and functionality of Crystal Enterprise in a Windows or a UNIX environment.

The full stand-alone installation on Windows is generally the quickest to perform, and it provides you with all the functionality you will require to proceed through the remaining chapters in this guide. The UNIX installation is also highly automated, but it is recommended that you attempt this installation only if you have some administrative experience on your UNIX system.

For complete installation procedures, consult the *Crystal Enterprise Installation Guide* (`install.pdf`) included with your product distribution.

Installing Crystal Enterprise on Windows

This chapter describes two preliminary installation scenarios that enable you to get Crystal Enterprise up and running quickly. For information on more advanced deployment scenarios, including information on selecting the best scenario for the deployment of custom applications, see the section on planning your installation in the *Crystal Enterprise Installation Guide* (`install.pdf`) included with your product distribution.

Before you install Crystal Enterprise on Windows, consider which of the following scenarios is best for you:

- **Full stand-alone installation**

In this scenario, you install Crystal Enterprise on a single machine that is already running as a web server. This provides the quickest way to install Crystal Enterprise.

For details, see "[Full stand-alone installation](#)" on page 17.

- **Server-side installation connected to a web server**

In this scenario, you maintain separation between Crystal Enterprise and your web server by running them on separate machines. Once you've installed Crystal Enterprise on one machine, you install and configure the Web Connector on the web server machine.

This scenario is also ideal if you have a single UNIX server that is running as your dedicated web server. You retain the use of your UNIX web server, and you can still install Crystal Enterprise on Windows.

For details, see “Server-side installation connected to a web server” on page 17.

Note: For more installation options, such as custom and expanded installations, consult the *Crystal Enterprise Installation Guide* (`install.pdf`) included with your product distribution.

System requirements

For a detailed list of tested environments, consult the `Platforms.txt` file included with your product distribution. This file includes specific version and Service Pack requirements for supported web servers, web browsers, databases, and operating systems. Generally, however, the following components must be installed and configured correctly before you install Crystal Enterprise:

- Windows NT/2000
- Internet Explorer or Netscape Navigator
- Web server software

Crystal Enterprise requires a database to store information about the system and its users. However, the Setup program can install its own Microsoft Data Engine (MSDE) database by default.

Full stand-alone installation

This installation scenario offers the quickest way to install Crystal Enterprise. Once you have set up your web server software, run the New installation from the Crystal Enterprise Setup program.

When you perform this default installation, all of the client and server components are installed on the local machine. The Crystal Management Server (CMS) automatically creates its own database. The Web Connector is automatically configured to allow communication between Crystal Enterprise and the web server software that you have already installed. Default user and group accounts are created, and sample reports are published to the system. When the installation is complete, the server components are started as services on the local machine.

Note: For explicit procedural details covering this installation scenario, consult the *Crystal Enterprise Installation Guide* (`install.pdf`) included with your product distribution.

Server-side installation connected to a web server

A server-side installation connected to a web server is a quick way to integrate Crystal Enterprise with your existing web server—without installing the core Crystal Enterprise components on the web server itself.

First, on the machine that you have set aside for use by Crystal Enterprise, run the New installation from the Crystal Enterprise Setup program. Then, install and configure the appropriate Web Connector on your web server machine.

- If the web server is running on Windows, you can select the Web Connector by running the Custom installation from the Crystal Enterprise Setup program.
- If the web server is running on UNIX, you will need to run the Web Connector installation (the `webconn_install.sh` script) on that machine and perform additional configuration. For details, see the *Crystal Enterprise Installation Guide* (`install.pdf`).

When you perform this installation, the client and server components are installed, the default user and group accounts are created, and the sample reports are published to the system. When the installation is complete, the server components are started as services on the local machine.

Note: For explicit procedural details covering this installation scenario, consult the *Crystal Enterprise Installation Guide* (`install.pdf`) included with your product distribution.

Installing Crystal Enterprise on UNIX

Crystal Enterprise allows you to run all server components on a UNIX server. Users then connect to Crystal Enterprise over the Web with Internet Explorer or Netscape Navigator. The installation can place the necessary run control scripts in the relevant directories for automated startup (requires root privileges). Or you can confine the installation to a particular directory. Once you've finished the installation and setup procedures, the various server components run as daemons.

Before you run the interactive installation shell script (`install.sh`), it is strongly recommended that you consult the appropriate sections of the *Crystal Enterprise Installation Guide* (`install.pdf`). There you will find complete set up, installation, and configuration procedures.

Note: If you install the Crystal Enterprise server components on a UNIX machine, you can connect remotely to Crystal Enterprise with the Crystal Publishing Wizard and the Crystal Import Wizard. However, these client applications must be installed on Windows.

System requirements

For a detailed list of tested environments, please consult the `Platforms.txt` file included with your product distribution. This file includes specific version and patch-level requirements for supported web servers, application servers, web browsers, and operating systems. Generally, however, the following components must be installed and configured correctly before you install Crystal Enterprise:

- Java SDK and a Java application server
- Database software that is compatible with the Crystal Management Server
- Internet Explorer or Netscape Navigator
- 256 MB RAM
- 700 MB free disk space

Note: Crystal Enterprise requires a database to store information about the system and its users. For details, see the *Crystal Enterprise Installation Guide* (`install.pdf`).

This chapter serves as an introduction to working with Crystal Enterprise and viewing reports with the Crystal Report Viewer.

Crystal Enterprise web desktop overview

Crystal Enterprise comes with a standard web desktop. Think of it as a window to a broad range of useful business information around your company, including Crystal Reports, Crystal Analysis reports, spreadsheets, and other documents.

The features available in the Crystal Enterprise web desktop vary by content type, but in general, you can view information in your web browser, export it to other business applications (such as Excel), and save information to your local machine.

This chapter provides a quick introduction to some of the Crystal Enterprise web desktop's key features. For more information, see the *Crystal Enterprise User's Guide*.

Note: The tasks that you can perform in the Crystal Enterprise web desktop are determined by the rights you have been granted on the system by your administrator.

Working with Crystal Enterprise

To give you a better idea of how Crystal Enterprise can be used at your company, a Guest user account is provided. There may also be sample objects installed on your system.

When the Guest account is enabled, Crystal Enterprise logs you on automatically without an administered account. You can use this default view, but you won't be able to customize the desktop with your personal settings. If you sign yourself up as a new user, you can create a view of Crystal Enterprise that includes your desktop settings and favorite objects. For details, see ["Signing up for your own Enterprise account"](#) on page 23.

Accessing Crystal Enterprise

There are two ways to access Crystal Enterprise: type the URL for your Crystal Enterprise web desktop directly in your web browser, or select Crystal Enterprise User Launchpad from the Program group on the Windows Start menu.

To access Crystal Enterprise

- 1 Choose one of the following options:
 - Go to the Crystal Enterprise User Launchpad:
`http://webserver/crystal/enterprise10/`
Replace *webserver* with the name of the web server that is set up for Crystal Enterprise. You may need to check with your administrator for the web server name or exact URL to enter.
 - If you have any Crystal Enterprise client tools installed locally on your machine, in Windows, click Start > Programs > Crystal Enterprise > Crystal Enterprise User Launchpad.

- 2 On the Crystal Enterprise User Launchpad, click the **Crystal Enterprise** link. The Crystal Enterprise web desktop appears. You are logged on as a guest. (If your administrator has disabled guest logon, you must type a user name and password.)
- 3 Choose a log on option.
When accessing Crystal Enterprise, you will either be automatically logged on to your existing account, prompted for your log on information, or logged in as a guest user.
 - If prompted for your log on information, enter your user name and password as assigned by your administrator.
 - If you are logged on as a guest but have an existing account, you can log on by clicking **Log On** in the upper right corner of the Crystal Enterprise web desktop and entering your user name and password as prompted.
 - If you are logged on as a guest and are a new user you can view Crystal Enterprise with limited access as determined by your administrator, or you can sign up for your own Enterprise account.

Signing up for your own Enterprise account

If Crystal Enterprise's Sign Up feature is enabled, you can create your own user account.

To sign up for your own account

- 1 Click the **Sign Up** button in the upper right corner of the Crystal Enterprise web desktop.
Note: If the Sign Up button is not present, then the feature is currently disabled. For details, see [“Allowing guest users to create Enterprise accounts” on page 36.](#)
- 2 On the Sign Up page, provide your **Full Name**.
- 3 Type a **User Name** for your new account.
- 4 In the **Password** and **Confirm Password** fields, type a password.
- 5 Click **Sign Up**.
Crystal Enterprise creates your new account and logs you on to the Crystal Enterprise web desktop.

Locating and viewing objects

When you access Crystal Enterprise as a guest user, you are presented with a list of folders, reports, and other objects that your administrator has made publicly accessible. Depending on your system, you may see the Report Samples folder and/or other folders and reports that have been added to the system.

When you log on to Crystal Enterprise with your own user account, you also have access to your Favorites folder. To view files that you put in your Favorites folder, click the Favorites folder under the Home icon in the upper left corner.

Click the name of any folder to view its contents. Or use the “Search” field and its list of options to search for objects by title, description, folder title, or all fields. Hold the mouse over any object’s thumbnail or title to see its title and summary information, if available.

To view an object

- 1 Click any object’s link.
- 2 On the shortcut menu, click **View** or **View Latest Instance**.

If you click a report object, it opens in the appropriate Crystal Report Viewer. Crystal Report Viewers also allow you to navigate through multiple pages, refresh data, drill down to see details behind charts and summarized data, select parameters, and so on. Viewers also include printing and exporting capabilities.

Note: Depending on the rights given to you by your administrator, you may or may not be able to select “View” and/or “View Latest Instance.” You may also need to schedule the object first, in order to generate an instance.

Creating and modifying reports

You can create and publish new reports to Crystal Enterprise. To create a new report, click the New Report button on the title bar. The New Report Wizard appears. Click the Help link (located at the top-right corner) for more information.

Note: Your Crystal Enterprise license key and your user rights determine whether or not you can create new reports or modify existing reports. Depending on your license key, the New Report button may not be visible, and the Modify shortcut may not be available.

You can also modify an existing report in Crystal Enterprise. Modify a report by clicking its link, and, on the shortcut menu, click Modify. The Modify Report Wizard appears. Click the Help link (located at the top-right corner) for more information.

In order to create or modify a report, you must have at least View On Demand rights and edit rights. Contact your Crystal Enterprise administrator for more information.

Scheduling objects

Scheduling an object lets you run it automatically at specified times. When a scheduled object runs successfully, an instance is created. An instance is a version of the object containing the data available at the time it was run—instances created later contain more recent data.

You can see a list of instances by looking at an object's history, and you can click the link to any historical instance. If you have the rights to view objects on demand, you can view and refresh any instance to retrieve the latest data from the database.

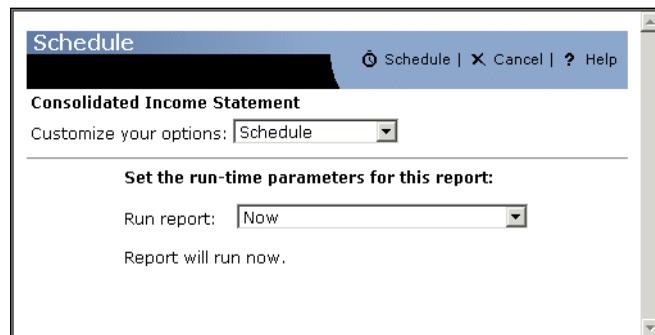
By scheduling and viewing instances, you can ensure you have the latest information available for viewing, printing, and distributing. For example, you can schedule a report object to run every night so it's available for you first thing in the morning.

Note: Before scheduling objects, check your time zone setting on the Preferences page in Crystal Enterprise. The default time zone is local to the web server that is running Crystal Enterprise, not to the Crystal Management Server (CMS) machine(s) that each user connects to. By setting your time zone, you ensure that your scheduled objects are processed in accordance with the time zone in which you are working. You must have your own account on the system in order to set your preferences.

To schedule an object

- 1 Click the object you want to schedule.
- 2 On the shortcut menu, click **Schedule**.

The Schedule page appears.



The “Customize your options” list contains the choices you can make while scheduling. The area below the list contains items specific to the schedule option you choose.

Schedule options

Schedule

The Schedule parameters specify a time for running a scheduled object. Each parameter in the “Run report” list has its own specific data entry requirements. For instance, if you select Once, you will be prompted to provide the date and time when you want to run the object.

Database Logon

Some objects require you to log on to a database before you can schedule them successfully. You can do this on the Schedule page if you have credentials for the object's data source.

Parameters

Some objects use the parameters feature. Parameters prompt the user to enter information. For report objects, this information may determine what data appears in the report. For example, in a report used by sales, there might be a parameter that asks the user to choose a region. The report returns the results for the specific region instead of returning the results for all of the regions.

You can set parameters on the Schedule page. If the object you schedule does not contain parameters, you will not be able to choose this option in the "Customize your options" list.

Filters

If a report object includes a record or group selection formula, you can modify it before you schedule the report. Selection formulas help determine what data appears in a report and may improve performance by eliminating unwanted records. For more information on selection formulas, see the *Crystal Reports User's Guide*.

Destination

These options allow you to send a scheduled object directly to a particular destination once it has been processed. You can have Crystal Enterprise save the file to disk, email it to a predetermined list of recipients, or upload it to an FTP server.

Format

Use this option to specify the file format for scheduled report objects. The default format is Crystal Report, but you can choose from a variety of popular formats including Adobe Acrobat, Microsoft Excel and Word, Rich Text, and so on.

Print Settings

You can choose to print a report instance when scheduling it; report instances are always printed in Crystal Reports format. When printing a report, you can set the number of copies and the page range.

The Print Settings page contains two areas: the first area specifies whether or not a report instance is printed, and if printed, the number of copies and the page range; the second area specifies the printer, and custom layout settings for changing the page size and orientation (regardless of whether the report instance is printed or not).

Viewing an object's history

Crystal Enterprise tracks scheduled object instances—you can see a list of instances by looking at an object's history, and you can click the link to any historical instance.

To view an object's history

- Click the object's link; then click **History**.

Viewing a report's alerts

Crystal Enterprise tracks report instances that trigger alerts. Alerts are custom messages created in Crystal Reports that appear when certain conditions are met by report data. Alerts may indicate action to be taken by the user or information about report data.

To view a report's alerts

- Click the report's link; then click **Alerts**.

Exporting reports

The Crystal Report Viewers allow you to export reports to several reporting formats as well as to popular word processor and spreadsheet formats. This makes the distribution of information easier. Depending on which Crystal Report Viewer you use, the steps detailed below may be different; however, the general principles remain the same.

Tip:

- You can select the page range for the report that you want to export.
- For reports in which you can drill down, you can export the drill-down view.

To export a report

- 1 View any report in a Crystal Report Viewer.
- 2 On the viewer's Standard toolbar, click **Export Report**.
The Export Report dialog box appears.
- 3 From the Export format list, select an export format type.
- 4 In the "Page Range" area, select either **All** or **Pages**. For the latter, specify the page range.
- 5 Click **Export**.
Your browser may prompt you for security information. If you choose to save the report to your computer, the Save As dialog box appears (see step 6); otherwise the report opens, unsaved, in the specified application and the export process is complete.

- 6 In the Save As dialog box, browse the **Save in** list to navigate to the folder in which you want to save the report, and next to **File name** enter a name for the report.
- 7 Click **Save**.
The Exporting Report dialog box appears, displaying the progress of your report. When the report has been exported, a message appears asking if you would like to open it.
- 8 Click **Open** to open the exported report or **Open Folder** to navigate to the report; otherwise, click **Close**.

Note:

- When you export a report to a file format other than Crystal Reports format (.rpt), you may lose some or all of the formatting that appears in your report. However, the program attempts to preserve as much formatting as the export format allows.
- The difference between Excel and Excel (Data only) is that an export to Excel attempts to preserve the look and feel of your original report, while an export to Excel (Data only) exports only the data, with each cell representing a field.

Printing reports from the Crystal Report Viewers

This procedure shows how to print a report to a printer that is accessible from your local machine.

To print a report from a viewer

- 1 View any report in a Crystal Report Viewer.
- 2 On the viewer's Standard toolbar, click **Print Report**.
Tip: If the Print Report button is unavailable, export the report to a printable local file, or use your browser's Print command.
The Print dialog box appears.
- 3 In the "Print Range" area, select all pages or a specific range of pages.
- 4 In the copies area, select the number of copies for the report.
- 5 If you select the **Collate** check box, the report prints each page in order.
For example, if you are printing two copies of a report with four pages, your report prints page one, two, three, and four of the first copy, then prints the second copy.
- 6 Click **OK**.
The Printing Records dialog box appears, displaying the progress of your print job.

This chapter focuses on the Crystal Management Console and provides you with information about how to create and change user accounts.

Administration overview

Administration can be thought of as all of the tasks that are required to make sure that everyone who requires access to your Crystal Enterprise content has an account, belongs to the appropriate group, has sufficient privileges, and has a report to access. These tasks are usually performed by System Administrators or Information Technology Specialists.

In most implementations, administrators will use three applications to manage Crystal Enterprise:

- Crystal Management Console
- Crystal Publishing Wizard
- Crystal Configuration Manager

This chapter focuses on how to create and modify user accounts with the Crystal Management Console (CMC), the largest of the three administration applications.

See the *Crystal Enterprise Administrator's Guide* for in-depth information about administration tasks. You can access the guide by clicking the Administrator's Guide link in the Crystal Enterprise Admin Launchpad.

Administration tasks

This section describes how to perform several different administrative tasks. These tasks range from accessing the Crystal Management Console to changing password settings. Each task includes the relevant procedural information.

As you proceed through the steps, you will create your own administrative account that you can use to log on to the system.

Logging on to the Crystal Management Console

There are two ways to access the CMC: type the name of the machine you are accessing directly into your browser, or select Crystal Enterprise Admin Launchpad from the program group on the Windows Start menu.

To log on to the CMC

1 Choose one of the following two options:

- Go to the following page:

`http://webserver/crystal/enterprise10/admin/`

On Windows, replace *webserver* with the name of the web server machine that has the Web Connector component installed. If you changed this default virtual directory on the web server, you will need to type your URL accordingly.

On UNIX, replace *webserver* with the name and port number of your Java application server.

- If you have Crystal Enterprise installed locally on your machine, in Windows, click Start > Programs > Crystal Enterprise > Crystal Enterprise Admin Launchpad, and then click the Crystal Management Console link.
- 2 When the Log On page appears, select **Enterprise** in the **Authentication Type** list.
Windows NT, Windows AD, and LDAP authentication may all appear in the list; however, you must map your third-party user accounts and groups to Crystal Enterprise before you can use these types of authentication.
 - 3 Type your **User Name** and **Password**.
For this example, type `Administrator` as the User Name. This default Enterprise account does not have a password until you create one. For details, see [“Setting the Administrator password” on page 35](#).
If you’re using LDAP, Windows AD, or Windows NT authentication, you may log on using an account that has been mapped to the Crystal Enterprise Administrators group.
 - 4 Click **Log On**.
The CMC Home page appears.

Navigating within the Crystal Management Console

Because the CMC is a web-based application, you can navigate through its areas and pages in a number of ways:

- Click the links on the Home page to go to specific “management areas.”
- Select the same “management areas” from the drop-down list in the upper-left corner of the console. Click Go if your browser doesn’t take you directly to the new page.
- Click hyperlinks and icons that let you to jump to other areas.

Once you leave the Home page, your location within the CMC is indicated by a path that appears above the title of each page. For example, `Home > Users > New User` indicates that you’re on the New User page. You can click the hyperlinked portions of the path to jump quickly to different parts of the application. In this example, you could click `Home` or `Users` to go to the corresponding page.

Logging off of the Crystal Management Console

When you have finished using the Crystal Management Console, end the session by logging off. Log off is located in the upper right corner of the console.

Creating a user account

To add a new user, you can go to the Users management area. This example sets up a new account that you can use for the remainder of this guide.

To create a new Enterprise account

- 1 Log on to the Crystal Management Console and click **Users**.
This takes you to the Users management area of the CMC.
- 2 Click **New User**.
The New User's Properties tab appears.
- 3 In the **Account Name** field, type a name for the new account.
For this example, type your own name.
- 4 Use the optional **Full Name** and **Description** fields if you want to include extra information about the account.
- 5 In the **Password** and **Confirm** fields, type a password for your new account.
The maximum password length is 64 characters.
- 6 Select from the additional password options:
 - **Password never expires**
Select the check box if you want to enable this option.
 - **User must change password at next logon**
This check box is selected by default. If you do not want to force users to change the password the first time they log on, clear the check box.
 - **User cannot change password**
Select the check box if you want to enable this option.
- 7 Select the connection type.
 - **Concurrent User**
Choose Concurrent User if this user belongs to a license agreement that states the number of users allowed to be connected at one time.
 - **Named User**
Choose Named User if this user belongs to a license agreement that associates the account with the name of the user. Named user licenses are useful for people who require access to Crystal Enterprise regardless of the number of other people who are currently connected.
- 8 Click **OK**.
The new account is added to the system. You can now add the user account to one or more groups.

Adding the user account to a group

Use this procedure to specify the groups that a particular user belong to. This example adds your new user account to the Crystal Enterprise Administrators group.

To add a user account to a group

- 1 Once you've added a new user account, click the **Member of** tab.
Tip: If you've left the account's Properties page, first select Users from the list of management areas. Then click the Account Name of the user account that you want to change.
- 2 Click the **Member of** button to view the available groups.
 There are three default groups available:
 - Administrators
 Administrators are able to perform all tasks in all applications.
 - Everyone
 The Everyone group is the default group for all new users, including those who use Crystal Enterprise's Sign Up feature to create their own account.
 - New Sign-Up Accounts
 Users who create new accounts using Crystal Enterprise's Sign Up feature are automatically made members of the New Sign-Up Accounts group. Thus, administrators will be able to determine whether a user is a new user or not.
- 3 In the **Available groups** list, select **Administrators**; then click the > arrow.
- 4 Click **OK**.
 You can now use this account to log on to Crystal Enterprise and the Crystal Management Console with full administrative rights.

Modifying a user account

Use this procedure to modify a user's properties or group membership information, or to temporarily disable an account. The changes will take effect the next time the user logs on.

To modify a user account

- 1 Go to the **Users** management area of the CMC.
 The Users page appears.
- 2 Click the **Account Name** of the user whose properties you want to change.
- 3 On the **Properties** page, make your changes to the account information, password settings, connection type, and so on.
Tip: You can temporarily disable a user's account by selecting the "Account is disabled" check box.
- 4 Click **Update**.
- 5 To change the group membership for the account, click the **Member of** tab, and then click the **Member of** button.
 The "Modify Member of" page appears.

- 6 Select a group or groups and click the appropriate arrow to change the account's group membership.
- 7 Click **OK**.

Deleting a user account

Use this procedure to delete a user's account permanently. The user account will not be available the next time the user tries to log on. If you think the user might require the account again, use the disable feature instead. See ["Modifying a user account"](#) on page 33 for more information.

To delete a user account

- 1 Go to the **Users** management area of the CMC.
The Users page appears.
- 2 Select the check box associated with the user you want to delete.
- 3 Click **Delete**.
The delete confirmation dialog box appears.
- 4 Click **OK**.
The user account is deleted.
Note: If your implementation supports the sign-up feature, users who have had their accounts deleted are able to create a new account for themselves in the Crystal Enterprise web desktop.

Changing password settings

Within the Crystal Management Console, you can change the password settings for a specific user or for all users in the system. These procedures show how to modify the default password settings and how to change the password for the default Administrator account.

To change user password settings

- 1 Go to the **Users** management area of the CMC.
The Users page appears.
- 2 Click the user whose password settings you want to change.
The Properties page appears.
- 3 Select or clear the check boxes associated with password settings.
The available options are:
 - Password never expires
 - User must change password at next logon
 - User cannot change password
- 4 Click **Update**.

To change password settings

- 1 Go to the **Authentication** management area of the CMC.
- 2 Click the **Enterprise** tab.
- 3 To enable a password restriction, select its check box and, if applicable, enter a value related to the password setting.
The table below lists the available restrictions, and identifies the minimum and maximum values where applicable:

Password Setting	Minimum	Recommended Maximum
Must contain at least N characters	0 characters	64 characters
Must change password every N day(s)	1 day	100 days
Cannot reuse the N most recent password(s)	1 password	100 passwords
Must wait N minute(s) to change password	1 minute	100 minutes
Disable account after N failed attempts to log on	1 failed	100 failed
Reset failed logon count after N minute(s)	1 minute	100 minutes
Re-enable account after N minute(s)	1 minute	100 minutes

- 4 Click **Update**.

Setting the Administrator password

As part of the installation, Crystal Enterprise creates an Administrator account and a Guest account that do not have passwords. Log on to the Crystal Management Console (CMC) with the Administrator account and use the following procedure to create a secure password for the Administrator account.

Note: Do not create a password for the Guest account if you plan to use the anonymous Single Sign On or the Sign Up features available in the Crystal Enterprise web desktop. For details, see [“Allowing guest users to create Enterprise accounts”](#).

To change the Administrator password

- 1 Go to the **Users** management area of the CMC.
- 2 Click the link for the **Administrator** account.
- 3 In the **Enterprise Password Settings** area, enter and confirm the new password.
- 4 If it is selected, clear the “User must change password at next logon” check box.
- 5 Click **Update**.

Allowing guest users to create Enterprise accounts

By default, Crystal Enterprise logs users on with the system's Guest account. With this account, users actions are somewhat restricted. Without a dedicated user account, users cannot create their own folders, organize their favorites, or set their preferences. By enabling Crystal Enterprise's Sign Up feature, you allow these Guest users to create their own Enterprise accounts.

Note: By default, new Sign Up accounts are added to the Everyone group and the New Sign-Up Accounts group.

To enable Crystal Enterprise's Sign Up feature

- 1 Go to the **Authentication** management area of the CMC.
- 2 Click the **Enterprise** tab.
- 3 Select the **"Guest" users can create their own Enterprise accounts** check box.
- 4 Click **Update**.

Publishing Objects to Crystal Enterprise **6**

This chapter focuses on the publishing process: it introduces the Crystal Publishing Wizard and tells you how you can use it to add Crystal reports (RPT and CAR files) and other objects to the Crystal Enterprise web desktop or to your custom web desktop; it also describes alternative ways of adding objects to the Crystal Enterprise environment.

Publishing overview

Publishing is the process of adding objects such as Crystal reports to the Crystal Enterprise environment and making them available to authorized users. There are several types of objects that you can publish to Crystal Enterprise: reports (RPT and CAR files), programs, Microsoft Excel files, Microsoft Word files, Microsoft PowerPoint files, Adobe Acrobat PDFs, rich text format files, text files, and hyperlinks, as well as object packages, which consist of report and/or program objects.

When you publish an object to Crystal Enterprise, an entry is made in the Crystal Management Server (CMS) database. The Input File Repository Server stores the new object below the `\Enterprise\FileStore\Input\data\` directory. When a user schedules an instance of any object, Crystal Enterprise queries the CMS for the location of the object file; the appropriate server component then retrieves and processes the object file from the Input File Repository. The processed instance is stored by the Output File Repository Server below the `\Enterprise\FileStore\Output\data\` directory.

Note: Only reports, programs, and object packages can be scheduled. Thus, only these three types of objects have instances.

You can publish objects to Crystal Enterprise in three ways:

- Use the Crystal Publishing Wizard when you:
 - Have access to the locally installed application.
 - Are adding multiple objects or an entire directory.

For details, see [“Publishing with the Crystal Publishing Wizard” on page 39.](#)

- Use the Crystal Management Console (CMC) when you are:
 - Publishing a single object.
 - Taking care of other administrative tasks.
 - Performing tasks remotely.

For details, see [“Publishing with the Crystal Management Console” on page 47.](#)

- Save directly to your Enterprise folders when you are:
 - Designing reports with Crystal Reports.
 - Using the Crystal Analysis Application Designer.
 - Creating other objects with Crystal Enterprise plug-in components.

For details, see [“Saving objects directly to the CMS” on page 49.](#)

Note: Crystal Enterprise supports reports created in versions 6 through 10 of Crystal Reports. Once published to Crystal Enterprise, reports are saved, processed, and displayed in version 10 format.

Publishing options

During the publishing process, you specify how often an object is run. You can choose to set a schedule (recurring), or you can choose to let users set the schedule themselves (on demand).

For RPT report files, this affects when data is refreshed and what data users see (You cannot schedule Crystal Analysis reports (CAR files)):

- **Specifying the data that users see (recurring)**

This option is recommended for objects that are accessed by a large number of people and that do not require separate database logon credentials.

Benefits

- Users view the same instance of the report, reducing the number of times the database is hit (and thus system resources are used more effectively).
- The report instance is static (contains saved data) and is stored on the Cache Server, allowing multiple users to access the report at the same time.

Drawbacks

- The report instance the users see is based on the selection criteria (parameters and record selection formulas) and schedule set by the administrator.
- **Allowing users to update the data in the report (on demand)**

This option is recommended for smaller reports that use parameters and selection formulas, require separate database logon credentials, or have frequent data changes.

Benefits

- Users are able to determine the frequency in which the data in the report is updated.

Drawbacks

- Multiple users generating reports at the same time increases the load on the system and the number of times the database is hit.
- Each unique report page is cached separately. It's possible that the Cache Server can contain many copies of the cached report, each of them being generated by hitting the Page Server and database.

Publishing with the Crystal Publishing Wizard

The Crystal Publishing Wizard is a locally installed, 32-bit Windows application. The wizard is made up of a series of screens. Only the screens applicable to the objects or folders you are publishing appear. For example, the settings for parameters and schedule format do not appear when you publish Crystal Analysis applications. This section of the guide features a series of procedures to help you through the Crystal Publishing Wizard.

Once the object has been published, it will appear in the folder you specified in the Crystal Enterprise web desktop (or other web desktop) and in the Objects management area of the CMC.

Note: Depending on the rights assigned by your Crystal Enterprise administrator, you may not be able to publish objects using the Crystal Publishing Wizard.

Logging on to Crystal Enterprise

- 1 From the **Crystal Enterprise 10** program group, click **Crystal Publishing Wizard**.
- 2 Click **Next**.
- 3 In the **System** field, type the name of the CMS to which you want to add objects.
- 4 In the **User Name** and **Password** fields, type your Crystal Enterprise credentials.
- 5 From the **Authentication** list, select the appropriate authentication type.
- 6 Click **Next**.
The Select A File dialog box appears.

Adding objects

- 1 Depending on the type of object you are adding, click either **Add Files** or **Add Folders**.
- 2 Navigate to and select the object you want to add.
If you are adding a folder, you can choose to also add its subfolders by selecting the Include Subfolders check box.
Tip: Ensure the appropriate file type is listed in the Files of type field; by default this value is set to Report (*.rpt).
- 3 Repeat steps 1 and 2 for each of the objects you want to add.
- 4 Click **Next**.
The Folder Hierarchy dialog box appears if it is needed.

Duplicating the folder structure

If you are adding multiple objects from a directory and its subdirectories, you are asked if you want to duplicate the existing folder hierarchy on the CMS.

- 1 Click **Yes** or **No**.
Click the Yes button to have all of the folders and subfolders recreated on the CMS as they appear on your hard drive.
Click the No button to have all of the objects placed in a single folder.
- 2 Click **Next**.
The Specify Location dialog box appears.

Creating and selecting a folder on the CMS

To add the selected objects, you must create or select a folder on the host CMS. Only the folders that you have full control access to will appear.

- 1 Click the folder you want to add the objects to. Click + to the left of the folder to view the subfolders.



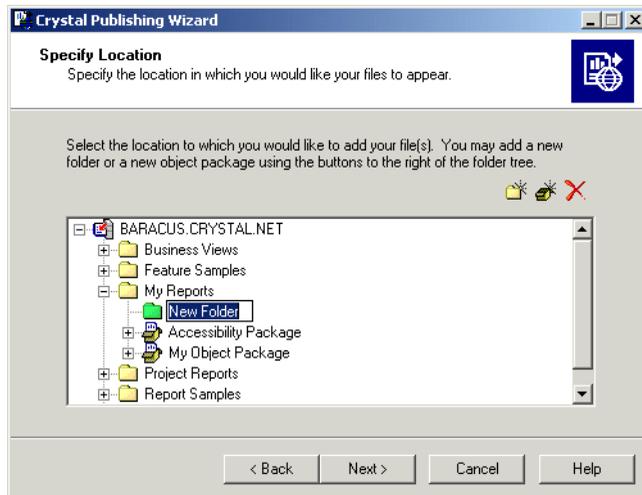
To add a new folder to the CMS, select a parent folder and then click the New Folder button. The new folder appears and can be renamed.



To add a new object package to the CMS, select a parent folder and then click the New Object Package button. The new object package appears and can be renamed.



To delete a folder or object package, select the item and click the Delete Folder button.



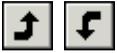
Note: From the wizard, you can delete only new folders and object packages. (New folders are green; existing folders are yellow.)

If you are adding multiple objects and want to place them in separate directories, you can do so in the next section.

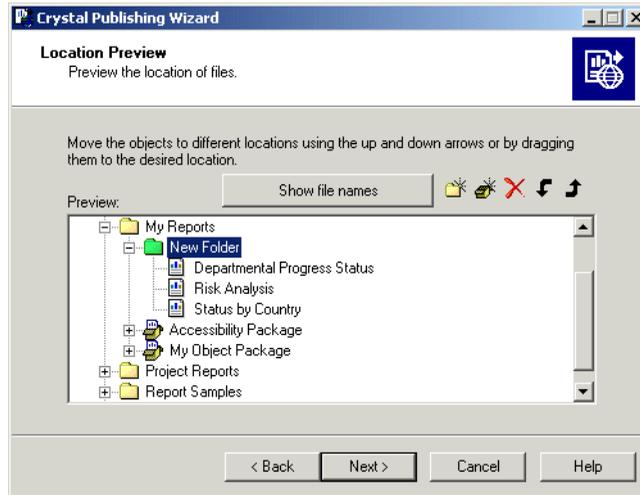
- 2 Click **Next**.

The Location Preview dialog box appears.

Moving objects between folders



- 1 Move objects to the desired folders by selecting each object and then clicking **Move Up** or **Move Down**.



You can also add folders and object packages by selecting a parent folder and clicking the New Folder or New Object Package button. To delete a folder or object packages, select it and click the Delete button. You can drag-and-drop objects to place them where you want. And you can right-click objects to rename them. By default, objects are displayed using their titles. You can display the objects' local file names by clicking the "Show file names" button.

- 2 Click **Next** when you are finished.
The Schedule Interval dialog box appears if it is needed.

Changing scheduling options

The Schedule Interval dialog box allows you to schedule each report, program, and/or object package that you are publishing to run at specific intervals.

Note: This dialog box appears only for objects that can be scheduled.

- 1 Select the object you want to schedule.
- 2 Select one of three intervals:
 - **Run once only**
Selecting the "Run once only" option provides two more sets of options:
 - **when finished this wizard**
This option runs the object once when you've finished publishing it. The object is not run again until you reschedule it.

- **at the specified date and time**
This option runs the object once at a date and time you specify. The object is not run again until you reschedule it.
 - **Let users update the object**
This option does not schedule the object. Instead, it leaves the task of scheduling up to the user.
 - **Run on a recurring schedule**
Once you have selected this option, click the Set Recurrence button to set the scheduling options.
The “Pick a recurrence schedule” dialog box appears.
The options in this dialog box allow you to choose when and how often the report runs. Select the appropriate options and click the OK button.
- 3 Click **Next** after you have set the schedule for each object you are publishing.

Enabling repository refresh

The Crystal Repository is a central location which stores shared report elements such as text objects, bitmaps, custom functions, and custom SQL commands. You can choose to refresh an object’s repository fields if the object references the repository. To complete this task, the Crystal Publishing Wizard needs to connect to your Crystal Repository database from the local machine. For details, see the *Crystal Enterprise Administrator’s Guide*.

Note: This dialog box appears only when you publish report objects.

To enable repository refresh

- 1 Select a report, and then select the **Use Object Repository when refreshing report** check box if you want to refresh it against the repository.
Tip: Click the “Enable All” button if you want to refresh all objects that reference the repository; click the “Disable All” button if you want to refresh none of the objects.
- 2 Click **Next** when you are finished.

Selecting a program type

- 1 In the **Program Type** dialog box, select a program.
- 2 Specify one of three program types:
 - **Binary/Batch**
Binary/Batch programs are executables such as binary files, batch files, or shell scripts. They generally have file extensions such as: .com, .exe, .bat, .sh. You can publish any executable program that can be run from the command line on the machine where the Program Job Server is running.

- **Java**
You can publish any Java program to Crystal Enterprise as a Java program object. They generally have a .jar file extension.
 - **Script**
Script program objects are JScript and VBScript scripts.
- 3 Once you have specified the type of each program you are adding, click **Next**. The Program credentials dialog box appears.
- Note:** For details about program objects and program object types, see the *Crystal Enterprise Administrator's Guide*.

Specifying program credentials

- 1 In the **Program Credentials** dialog box, select a program.
- 2 In the **User Name** and **Password** fields, specify the user credentials for the account for the program to run as.
The rights of the program are limited to those of the account that it runs as.
- 3 Once you have specified the user credentials for each program to run as, click **Next**. The Change Default Values dialog box appears.

Changing default values

You can choose to publish objects without changing any of the default properties, or you can go through the remaining screens and make changes.

Note: If you use the default values, your object may not schedule properly if the database logon information is not correct, or if the parameter values are invalid.

If you want to publish objects without making modifications:

- 1 Select **Publish without modifying properties**.
- 2 Click **Next** through the wizard's remaining dialog boxes.

If you want to review or modify objects before publishing:

- 1 Select **Review or modify properties**.
- 2 Click **Next**.
The Review Object Properties dialog box appears.

Changing object properties

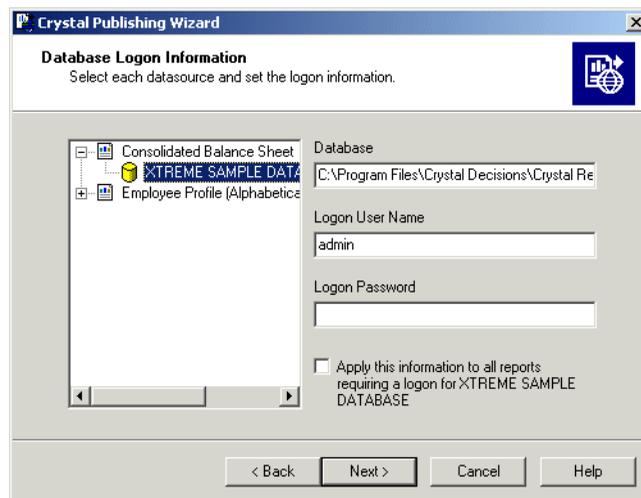
- 1 In the **Review Object Properties** dialog box, select the object you want to modify.
- 2 Enter a new title or description.

- 3 Select the **Generate thumbnail image** check box if you want users to see a thumbnail of a report object before they open it.
Tip: The “Generate thumbnail image” check box is available only if the object is an RPT file and was saved appropriately. To display thumbnails for a report, open the report in Crystal Reports and click Summary Info on the File menu. Select the “Save preview picture” check box and click OK. Preview the first page of the report and save your changes.
- 4 Click **Next**.
 The Database Logon Information dialog box appears if it is needed.

Entering database logon information

Some objects use data sources that require logon information. If objects you are adding are of this type, follow these steps.

- 1 Double-click the object, or click + to the left of the object to expose the database.



- 2 Select the database and change the logon information in the appropriate fields. If the database does not require a user name or password, leave the fields blank.
Note: Enter user name and password information carefully. If it is entered incorrectly, the object cannot retrieve data from the database.
- 3 Once you have completed the logon information for each object using a different database, click **Next**.
 The Set Report Parameters dialog box appears if it is needed.

Setting parameters

Some objects contain parameters for data selection. Before such an object can be scheduled, you must set the parameters in order to determine the default prompts.

- 1 Select the object whose prompts you want to change.
The object's prompts and default values appear in a list on the right-hand side of the screen.
- 2 Click **Edit Prompt** to change the value of a prompt.
Depending on the type of parameter you have chosen, different dialog boxes appear.
- 3 If you want to set the prompts to contain a null value (where possible), then click **Set Prompts to NULL**.
- 4 Click **Next** after you have finished editing the prompts for each object.
The Schedule Format dialog box appears.

Setting the schedule format

You can choose a schedule format for each report that you publish. For some of the formats, you can customize the schedule format options.

- 1 Select the object whose schedule format you want to change.
- 2 Select a format from the list (Crystal Report, Excel, Word, and so on).
Where applicable, customize the schedule format options. For example, if you select Paginated Text, enter the number of lines per page.
- 3 Click **Next**.
The Extra files for Program dialog box appears if it is needed.

Adding extra files for programs

Some programs require access to other files in order to run.

- 1 Select a program.
- 2 Click **Add** to navigate to and select the necessary file.
- 3 Once you have added all necessary extra files for each program, click **Next**.
The Command line for Program dialog box appears.

Specifying command line arguments

For each program, you can specify any command-line arguments supported by your program's command-line interface. They are passed directly to the command-line interface, without parsing.

- 1 Select a program.
- 2 In the **Command line** area, type the command-line arguments for your program, using the same format you would use at the command line itself.
- 3 Once you have specified all necessary command-line arguments for each program, click **Next**.
The final dialog box appears.

Finalizing the objects to be added

- 1 After ensuring all the objects you want to publish have been added to the list, click **Next**.
The objects are added to the CMS, scheduled, and run as specified. When the processing is done, you are returned to the final screen of the Crystal Publishing Wizard.
- 2 To view the details for an object, select it from the list.
- 3 Click **Finish** to close the wizard.

Publishing with the Crystal Management Console

If you have administrative rights to Crystal Enterprise, you can publish objects over the Web from within the CMC.

To add an object with the CMC

- 1 Go to the **Objects** management area of the CMC.
- 2 Click **New Object**.
The New Object page appears, with the Report properties displayed.

Home > Objects >
New Object

Report

- Object Package
- Program
- Microsoft Excel
- Microsoft Word
- Adobe Acrobat
- Text
- Rich Text
- Microsoft PowerPoint
- Hyperlink

Browse for an existing report
(New reports are created in this system by adding an existing report from outside the CMS)

Generate thumbnail for the report
 Use Object Repository when refreshing report

Then select a destination in which to save the report

Destination:

Look for:

- 3 On the left side of the page, click the type of object you want to add.
- 4 Enter the object's properties.
The properties that appear vary according to the type of object you are adding:

Property	Object Types	Description
File name	Report, Program, Microsoft Excel, Microsoft Word, Microsoft PowerPoint, Adobe Acrobat, Text, Rich Text	Type the full path to the object, or click Browse to perform a search.
Title	Object Package, Hyperlink	Type the name of the object.
Description	Object Package, Hyperlink	Type a description of the object.
Generate thumbnail for the report	Report	If you do not want the user to see a thumbnail preview of the report in Crystal Enterprise, clear the "Generate thumbnail for the report" check box. Tip: To display thumbnails for a report, open the report in Crystal Reports and click Summary Info on the File menu. Select the "Save preview picture" check box and click OK. Preview the first page of the report and save your changes.
Use Object Repository when refreshing report	Report	Select this option to automatically refresh an object's repository fields against the repository each time the report runs.
Program Type	Program	Select Executable, Java, or Script. Tip: <ul style="list-style-type: none"> • Run Java programs as Java program objects. • Run JScript and VBScript programs as Script program objects. • Run all other programs as Executable program objects.
URL	Hyperlink	Type the URL address of the page you want the hyperlink object to link to.

- 5 Ensure that the correct folder or object package name appears in the **Destination** field.
Tip:
 - To expand a folder, select it and click Show Subfolders.
 - To search for a specific folder or object package, use the Look For field.**Note:** Only report and program objects can be published to object packages.
- 6 Click **OK**.

When the object has been added to the system, the CMC displays the Properties screen. If necessary, you can now modify the object's properties, such as its title and description, the database logon information, scheduling information, user rights, and so on.

Saving objects directly to the CMS

If you have installed one of the Crystal designer components, such as Crystal Reports or Crystal Analysis, you can use the Save As command to add objects to Crystal Enterprise from within the designer itself.

For instance, after designing a report in Crystal Analysis, click Save As on the File menu. In the Save As dialog box, click Enterprise Folders; then, when prompted, log on to the Crystal Management Server (CMS). Specify the folder where you want to save the report and click Save.

Saving objects directly to the CMS

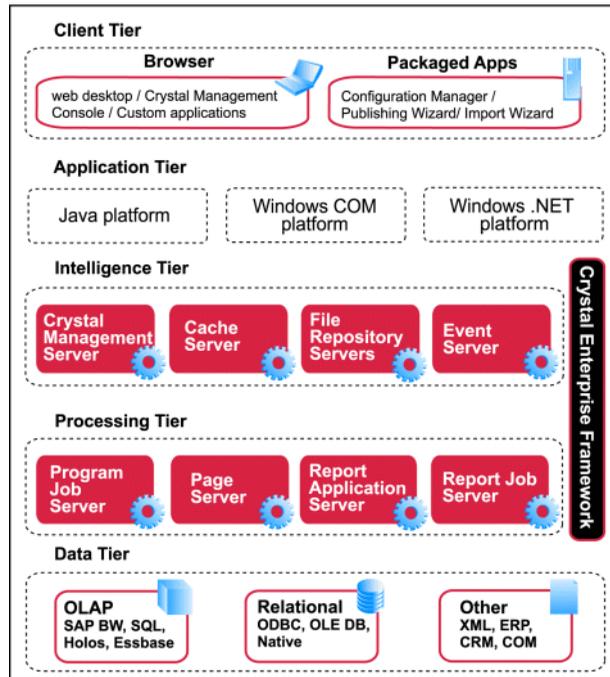
This chapter provides an overview of the Crystal Enterprise architecture, describes the different components, and identifies how they work together to distribute reports over the web.

Architecture overview and diagram

Crystal Enterprise is a multi-tier system. Although the components are responsible for different tasks, they can be logically grouped based on the type of work they perform. If you are new to Crystal Enterprise, use this chapter to gain familiarity with the Crystal Enterprise framework, its components, and the general tasks that each component performs.

In Crystal Enterprise, there are five tiers: the client tier, the application tier, the intelligence tier, the processing tier, and the data tier. To provide flexibility, the components that make up each of these tiers can be installed on one machine, or spread across many.

The following diagram illustrates how each of the components fits within the multi-tier system. Other Crystal products, such as Crystal Analysis and Smart Reporting Technology, plug in to the Crystal Enterprise framework in various ways. This chapter describes the framework itself. Consult each product’s installation or administration guides for details about how it integrates with the Crystal Enterprise framework.



The “servers” run as services on Windows machines. On UNIX, the servers run as daemons. These services can be “vertically scaled” to take full advantage of the hardware that they are running on, and they can be “horizontally scaled” to take

advantage of multiple computers over a network environment. This means that the services can all run on the same machine, or they can run on separate machines. The same service can also run in multiple instances on a single machine.

For example, you can run the Crystal Management Server and the Event Server on one machine, while you run the Page Server on a separate machine. This is called “horizontal scaling.” If the Page Server is running on a multi-processor computer, then you may choose to run multiple Page Servers on it. This is called “vertical scaling.” The important thing to understand is that, even though these are called servers, they are actually services and daemons that do not need to run on separate computers.

Note: Crystal Enterprise Standard requires all of the components, except for the Web Connector, to be installed on one machine.

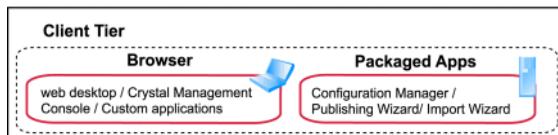
The remainder of this chapter describes each tier, the key Crystal Enterprise components, and their primary responsibilities.

Tip: When you are familiar with the architecture and want to customize your system configuration, see the *Crystal Enterprise Administrator’s Guide*.

Note: Crystal Enterprise supports reports created in versions 6 through 10 of Crystal Reports. Once published to Crystal Enterprise, reports are saved, processed, and displayed in version 10 format.

Client tier

The client tier is the only part of the Crystal Enterprise system that administrators and end users interact with directly. This tier is made up of the applications that enable people to administer, publish, and view reports and other objects.



Crystal Enterprise web desktop

Crystal Enterprise comes with a web-based interface that end users access to view, schedule, and keep track of published reports. Each Crystal Enterprise request that a user makes is directed to the Crystal Enterprise application tier. What happens next depends upon which Crystal Enterprise Software Development Kit (SDK) your system uses. In a Windows installation with the COM SDK (the default Windows option), the web server passes the user request to the Web Connector. The Web Connector then forwards the request to the WCS for processing. In an installation that uses the Java SDK, the web server forwards the user request directly to an application server where the request is processed by components built on the Crystal Enterprise SDK.

The Crystal Enterprise web desktop also serves as a demonstration of the ways in which you can use the Crystal Enterprise Software Development Kit (SDK) to create a custom web application for end users. For more information about the SDK, see the Web Developer's Guides available from the Crystal Enterprise Launchpad.

Crystal Management Console

The Crystal Management Console (CMC) allows you to perform user management tasks such as setting up authentication and adding users and groups. It also allows you to publish, organize, and set security levels for all of your Crystal Enterprise content. Additionally, the CMC enables you to manage servers and create server groups. Because the CMC is a web-based application, you can perform all of these administrative tasks remotely. For more information, see the *Crystal Enterprise Administrator's Guide*.

The CMC also serves as a demonstration of the ways in which you can use the administrative objects and libraries in the Crystal Enterprise SDK to create custom web applications for administering Crystal Enterprise. For more information about the SDK, see the Web Developer's Guides available from the Crystal Enterprise Launchpad.

Crystal Configuration Manager

The Crystal Configuration Manager (CCM) is a server-management tool that allows you to configure each of your Crystal Enterprise server components. This tool allows you to start, stop, enable, and disable servers, and it allows you to view and to configure advanced server settings. On Windows, these settings include default port numbers, CMS database and clustering details, SOCKS server connections, and more. In addition, on Windows the CCM allows you to add or remove servers from your Crystal Enterprise system. For more information, see the *Crystal Enterprise Administrator's Guide*.

Crystal Publishing Wizard

The Crystal Publishing Wizard is a locally installed Windows application that enables both administrators and end users to add reports to Crystal Enterprise. By assigning object rights to Crystal Enterprise folders, you control who can publish reports and where they can publish them to. For more information, see "[Publishing overview](#)" on page 38 and the *Crystal Enterprise Administrator's Guide*.

The Crystal Publishing Wizard publishes reports from a Windows machine to Crystal Enterprise servers running on Windows or on UNIX.

Crystal Import Wizard

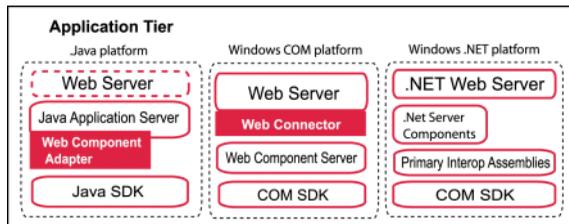
The Crystal Import Wizard is a locally installed Windows application that guides administrators through the process of importing users, groups, reports, and folders from an existing Crystal Enterprise or Info implementation to Crystal Enterprise. For more information, see the *Crystal Enterprise Administrator's Guide*.

The Crystal Import Wizard runs on Windows, but you can use it to import information into a new Crystal Enterprise system running on Windows or on UNIX.

Application tier

The application tier hosts the server-side components that are needed to process requests from the client tier as well as the components that are needed to communicate these requests to the appropriate server in the intelligence tier. The application tier includes support for report viewing and logic to understand and direct web requests to the appropriate Crystal Enterprise server in the intelligence tier.

Because Crystal Enterprise is designed to support a variety of web development platforms, the components included in your application tier will vary.



Windows COM platform

The default installation of Crystal Enterprise on Windows uses the Crystal Enterprise COM SDK. It includes a Web Connector and a Web Component Server, and requires the use of a web server.

Web Component Server

Crystal Enterprise systems that use the Windows COM SDK include a Web Component Server (WCS), and a Web Connector. The WCS is the gateway between the Web Connector on the web server and the rest of the components in Crystal Enterprise. The WCS is responsible for processing requests from your browser, including Crystal Server Pages (.csp files), which are used to customize your access to Crystal Enterprise. As a result, this server also acts as an application server. For further information on CSP, see the Web Developer's Guides available from the Crystal Enterprise Launchpad.

In addition to processing CSP requests, the WCS also handles other types of requests. These include requests from the CMC and the handling of prompts and database logon requests.

If you are running multiple Cache Servers, the WCS automatically load-balances reporting requests across the available servers.

Note: There is no WCS in UNIX installations of Crystal Enterprise, or in Windows installations that use the Crystal Enterprise Java SDK. The functionality of the WCS is provided by the Web Component Adapter (WCA).

Web Connectors

Crystal Enterprise systems that use the Windows COM SDK include a Web Connector. In these systems, the web server uses the Web Connector to forward user requests to the Web Component Server. Crystal Enterprise includes different Web Connectors for different operating systems and web servers.

If you are running multiple WCS machines, the Web Connector automatically balances the load across the available servers. For details about how the Web Connector handles communications with the WCS, especially with respect to security issues, see *of the Crystal Enterprise Administrator's Guide*.

For details on installing and configuring Web Connectors, see the *Crystal Enterprise Installation Guide*.

Note: There is no Web Connector in UNIX installations of Crystal Enterprise, or in Windows installations that use the Java SDK. In these systems the web server communicates directly with the application server that hosts the Crystal Enterprise SDK. Web connectors are still available for UNIX web servers that communicate with a Windows WCS.

Java platform

All UNIX installations of Crystal Enterprise and all Windows installations configured to use the Crystal Enterprise Java SDK include a Web Component Adapter. In this configuration, a Java application server is required to host the Web Component Adapter and the Crystal Enterprise Java SDK. The use of a web server is optional as you may choose to have static content hosted by the application server.

Application server and Crystal Enterprise Java SDK

Crystal Enterprise systems that use the Crystal Enterprise Java SDK run the SDK on a third party application server. See the `Platforms.txt` file included with your product distribution for a complete list of tested application servers and version requirements.

The application server acts as the gateway between the web server and the rest of the components in Crystal Enterprise. The application server is responsible for

processing requests from your browser, sending Crystal Server Pages (.csp files) to the Web Component Adapter, and using the Java SDK to interpret Crystal components in Java Server Pages (.jsp files). The application server also supports Java versions of the Crystal Enterprise web desktop and other Crystal applications, and uses the SDK to convert report pages (.epf files) to HTML format when users view pages with a DHTML viewer.

The application server replaces the Web Component Server (WCS) in Crystal Enterprise installations that run on UNIX, and in Windows installations that use the Crystal Enterprise Java SDK. See the Web Developer's Guides available from the Crystal Enterprise Launchpad for more information.

Web Component Adapter

In UNIX installations of Crystal Enterprise, or in Windows installations that use a Java SDK, there is no WCS and no Web Connector. Instead, the web server communicates directly with the application server that hosts the Crystal Enterprise SDK. The Web Component Adapter (WCA) runs within the application server and provides all WCS services that are not directly supported by the Java SDK. Because the WCA runs on an application server, it is not necessary to have a Web Connector on the web server. The web server passes requests directly to the application server, which then forwards the requests on to the WCA.

In this environment the WCA has two primary roles: it processes Crystal Server Pages (.csp files), and it also supports Crystal applications that formerly relied upon the WCS. These applications include the Crystal Management Console (CMC) and Crystal report viewers (that are implemented through `viewrpt.cwr` requests).

Windows .NET platform

Crystal Enterprise installations that use the .NET Framework include Primary Interop Assemblies (PIAs) that allow you to use the COM Crystal Enterprise SDK with ASP.NET, and a set of .NET Server Components that you can optionally use to simplify the development of custom applications. This configuration requires the use of a Microsoft Internet Information Services (IIS) web server.

You do not need a Web Connector, Web Component Server, or a Web Component Adapter for custom ASP.NET applications.

Web application environments

Crystal Enterprise supports Crystal Server Pages (.csp), Active Server Pages (.asp), and Java Server Pages (.jsp). Crystal Enterprise includes web applications developed in .csp and .jsp such as the Crystal Enterprise web desktop and the sample applications available via the Crystal Enterprise Launchpads. It also supports the development of custom web applications that use .csp, .asp, .jsp, and ASP.NET pages.

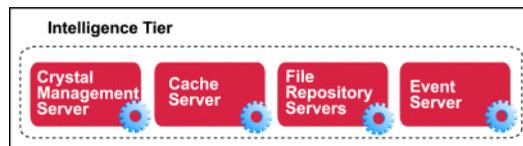
Crystal Server Pages (.csp) provide functionality similar to that provided by Microsoft's Active Server Pages (.asp). Java Server Pages (.jsp) allow you to develop cross-platform J2EE applications that use Crystal objects in conjunction with your own custom objects, or a wide variety of objects from third parties.

Crystal Enterprise also includes Primary Interop Assemblies (PIAs) that enable you to use the Crystal Enterprise SDK and Report Application Server SDK with ASP.NET. It also includes a set of .NET Server Components which simplify development of custom Crystal Enterprise applications in ASP.NET.

See the *Crystal Enterprise Web Developer's Guide* for more information.

Intelligence tier

The intelligence tier manages the Crystal Enterprise system. It maintains all of the security information, sends requests to the appropriate servers, manages audit information, and stores report instances.



Crystal Management Server

Note: In previous versions of Crystal Enterprise, the Crystal Management Server (CMS) was known as the Automated Process Scheduler (APS).

The CMS is responsible for maintaining a database of information about your Crystal Enterprise system; the other components can therefore access that data as required. The data stored by the CMS includes information about users and groups, security levels, Crystal Enterprise content, and servers. The CMS also maintains the Crystal Repository, and a separate audit database of information about user actions. This data allows the CMS to perform its four main tasks:

- **Maintaining security**
By maintaining a database of users and their associated object rights, the CMS enforces who has access to Crystal Enterprise and the types of tasks they are able to perform. This also includes enforcing and maintaining the licensing policy of your Crystal Enterprise system.
- **Managing objects**
The CMS keeps track of the location of objects and maintains the folder hierarchy. By communicating with the Report and Program Job Servers, the CMS is able to ensure that scheduled jobs run at the appropriate times.

- **Managing servers**

By staying in frequent contact with each of the servers in the system, the CMS is able to maintain a list of server status. Report viewers access this list, for instance, to identify which Cache Server is free to use for a report viewing request.

- **Managing auditing**

By collecting information about user actions from each Crystal Enterprise server, and then writing these records to a central audit database, the CMS acts as the system auditor. This audit information allows system administrators to better manage their Crystal Enterprise deployment.

Typically, you provide the CMS with database connectivity and credentials when you install Crystal Enterprise, so the CMS can create its own system database and Crystal Repository database using your organization's preferred database server. For details about setting up CMS databases, see the *Crystal Enterprise Installation Guide*, and the *Crystal Enterprise Administrator's Guide*. See the `Platforms.txt` file included with your product distribution for a complete list of tested database software and version requirements.

Note:

- It is strongly recommended that you back up the CMS system database, and the audit database frequently. The backup procedure depends upon your database software. If you are unsure of the procedure, consult with your database administrator.
- The CMS database should not be accessed directly. System information should only be retrieved using the calls that are provided in the Crystal Enterprise Software Development Kit (SDK). For details, see the Web Developer's Guides available from the Crystal Enterprise Launchpad.
- You can access the audit database directly to create custom audit reports. See the *Crystal Enterprise Administrator's Guide* for more information.

On Windows, the Setup program can install and configure its own Microsoft Data Engine (MSDE) database if necessary. MSDE is a client/server data engine that provides local data storage and is compatible with Microsoft SQL Server. If you already have the MSDE or SQL Server installed, the installation program uses it to create the CMS system database. You can migrate your default CMS system database to a supported database server later.

For details about configuring the CMS, its system database, and CMS clusters, see the *Crystal Enterprise Administrator's Guide*. For more information about Auditing, see the *Crystal Enterprise Administrator's Guide*.

File Repository Servers

There is an Input and an Output File Repository Server in every Crystal Enterprise implementation. The Input File Repository Server manages all of the report objects and program objects that have been published to the system by administrators or end users (using the Crystal Publishing Wizard, the Crystal Management Console,

the Crystal Import Wizard, or a Crystal designer component such as Crystal Reports). The Output File Repository Server manages all of the report instances generated by the Report Job Server and the program instances generated by the Program Job Server.

Tip: If you use the Crystal Enterprise SDK, you can also publish reports from within your own code.

The File Repository Servers are responsible for listing files on the server, querying for the size of a file, querying for the size of the entire file repository, adding files to the repository, and removing files from the repository.

Note:

- The Input and Output File Repository Servers cannot share the same directories. This is because one of the File Repository Servers could then delete files and directories belonging to the other.
- In larger deployments, there may be multiple Input and Output File Repository Servers, for redundancy. In this case, all Input File Repository Servers must share the same directory. Likewise, all Output File Repository Servers must share a directory.
- Objects with files associated with them, such as text files, Microsoft Word files, or PDFs, are stored on the File Repository Server.

Event Server

The Event Server manages file-based events. When you set up a file-based event within Crystal Enterprise, the Event Server monitors the directory that you specified. When the appropriate file appears in the monitored directory, the Event Server triggers your file-based event: that is, the Event Server notifies the CMS that the file-based event has occurred. The CMS then starts any jobs that are dependent upon your file-based event.

After notifying the CMS of the event, the Event Server resets itself and again monitors the directory for the appropriate file. When the file is newly created in the monitored directory, the Event Server again triggers your file-based event.

Note: Schedule-based events, and custom events are managed by the Crystal Management Server.

Cache Server

The Cache Server is responsible for handling all report viewing requests. The Cache Server checks whether or not it can fulfill the request with a cached report page. If the Cache Server finds a cached page that displays exactly the required data, with data that has been refreshed from the database within the interval that you have specified as the default, the Cache Server returns that cached report page.

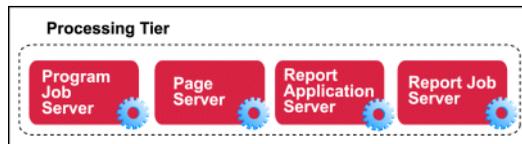
If the Cache Server cannot fulfil the request with a cached report page, it passes the request along to the Page Server. The Page Server runs the report and returns the results to the Cache Server. The Cache Server then caches the report page for future use, and returns the data to the viewer. By storing report pages in a cache, Crystal Enterprise avoids accessing the database each and every time a report is requested.

If you are running multiple Page Servers for a single Cache Server, the Cache Server automatically balances the processing load across Page Servers.

For more information, see the *Crystal Enterprise Administrator's Guide*.

Processing tier

The processing tier accesses the data and generates the reports. It is the only tier that interacts directly with the databases that contain the report data.



Report Job Server

A Job Server processes scheduled actions on objects at the request of the CMS. You can configure a Job Server to process either report objects or program objects when you add it to your Crystal Enterprise system. If you configure a Job Server to process report objects, it becomes a Report Job Server.

The Report Job Server processes scheduled reports, as requested by the CMS, and generates report instances (instances are versions of a report object that contain saved data). To generate a report instance, the Report Job Server communicates with the database to retrieve the current data.

Program Job Server

A Job Server processes scheduled actions on objects at the request of the CMS. You can configure a Job Server to process either report objects or program objects when you add it to your Crystal Enterprise system. If you configure a Job Server to process program objects, it becomes a Program Job Server.

Program objects allow you to write, publish, and schedule custom applications, including scripts or Java programs that run against, and perform maintenance work on, Crystal Enterprise.

The Program Job Server processes scheduled program objects, as requested by the CMS. To run a program, the Program Job Server first retrieves the files from storage on the Input File Repository Server, and then runs the program. By definition,

program objects are custom applications. Therefore the outcome of running a program will be dependent upon the particular program object that is run.

Unlike report instances, which can be viewed in their completed format, program instances exist as records in the object history. Crystal Enterprise stores the program's standard out and standard error in a text output file. This file appears when you click a program instance in the object History.

Page Server

The Page Server is primarily responsible for responding to page requests by processing reports and generating Encapsulated Page Format (EPF) pages. The EPF pages contain formatting information that defines the layout of the report. The Page Server retrieves data for the report from an instance or directly from the database (depending on the user's request and the rights he or she has to the report object). When retrieving data from the database, the Page Server automatically disconnects from the database after it fulfills its initial request and reconnects if necessary to retrieve additional data. (This behavior conserves database licenses.)

The Cache Server and Page Server work closely together. Specifically, the Page Server responds to page requests made by the Cache Server. The Page Server and Cache Server also interact to ensure cached EPF pages are reused as frequently as possible, and new pages are generated as soon as they are required. Crystal Enterprise takes advantage of this behavior by ensuring that the majority of report-viewing requests are made to the Cache Server and Page Server. (However, if a user's default viewer is the Advanced DHTML viewer, the report is processed by the Report Application Server.)

The Page Server also supports COM, ASP.NET, and Java viewer Software Development Kits (SDKs).

Report Application Server

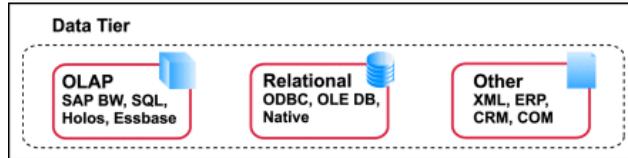
The Report Application Server (RAS) processes reports that users view with the Advanced DHTML viewer. The RAS also provides the ad hoc reporting capabilities that allow users to create and modify reports over the Web.

The RAS is very similar to the Page Server: it too is primarily responsible for responding to page requests by processing reports and generating EPF pages. However, the RAS uses an internal caching mechanism that involves no interaction with the Cache Server.

As with the Page Server, the RAS supports COM, ASP.NET, and Java viewer SDKs. The Report Application Server also includes an SDK for report-creation and modification, providing you with tools for building custom report interaction interfaces.

Data tier

The data tier is made up of the databases that contain the data used in the reports. Crystal Enterprise supports a wide range of corporate databases.



See the `Platforms.txt` file included with your product distribution for a complete list of tested database software and version requirements.

Report viewers

Crystal Enterprise includes report viewers that support different platforms and different browsers in the client tier, and which have different report viewing functionality. (For more information on the specific functionality or platform support provided by each report viewer, see the *Crystal Enterprise User's Guide* or the *Crystal Reports Developer's Guide*.)

All of the viewers fall into two categories: client-side viewers, and zero client viewers. Client-side viewers are downloaded and installed in the users' web browser while the code to support zero client viewers resides in the application tier.

client-side viewers

Active X viewer
Java viewer

zero client viewers

DHTML viewer
Advanced DHTML viewer

All report viewers help process requests for reports, and present report pages that appear in the user's browser.

Zero client viewers reside on the application server. When a user requests a report, the application server processes the request, and then retrieves the report pages in .epf format from the Crystal Enterprise framework. The SDK creates a viewer object on the application server which processes the .epf and creates DHTML pages that represent both the viewer controls and the report itself. The viewer object then sends these pages through the web server to the user's web browser.

Client-side viewers are downloaded and installed in the user's browser. When a user requests a report, the application server processes the request, and retrieves the report pages in .epf format from the Crystal Enterprise framework. The application server then passes the .epf file to the client-side viewer, which processes the .epf files and displays them directly in the browser.

If they haven't already done so, users are prompted to download and install the appropriate viewer software before the report is displayed in the browser. The Active X viewer is downloaded the first time a user requests a report, and then remains installed on the user's machine. You will be prompted to reinstall the ActiveX viewer only when a new version becomes available on the server.

Information Flow

This section describes the interaction of the server components in order to demonstrate how report-processing is performed. This section covers two different scenarios:

- “What happens when you view a report?” on page 64
- “What happens when you schedule a report?” on page 66

What happens when you view a report?

This section describes the viewing mechanisms that are implemented in the Crystal Enterprise web desktop. The description of processing flow covers both the case where the web desktop is implemented with Crystal Server Pages and uses the Web Component Server (WCS) as its application server, and the case where the web desktop is implemented in Java Server Pages and runs in a generic application server. The processing flow for custom ASP, JSP, and ASP.NET applications may differ.

When you view a Crystal report (.rpt file) through Crystal Enterprise, the processing flow varies depending upon your default report viewer, the type of report, and the rights you have to the report. In all cases, however, the request that begins at the web server must be forwarded to the application server.

The actual request is constructed as a URL that includes the report's unique ID. This ID is passed as a parameter to a server-side script that, when evaluated by the application server, verifies the user's session and retrieves the logon token from the browser. The script then checks the user's Crystal Enterprise web desktop preferences and redirects the request to the viewing mechanism that corresponds to the user's default viewer.

Different report viewers require different viewing mechanisms:

- The zero-client DHTML viewer is implemented through `viewreport.csp` or `viewreport.jsp`.

When evaluated by the application server, this script communicates with the framework (through the published SDK interfaces) in order to create a viewer object and retrieve a report source from the Cache Server and Page Server.

- The zero-client Advanced DHTML viewer is implemented through `viewreport_ia.csp` or `viewreport_ia.jsp`.

When evaluated by the application server, this script communicates with the framework (through the published SDK interfaces) in order to create a viewer object and retrieve a report source from the Report Application Server.

- The client-side report viewers (the ActiveX and Java viewers) are implemented through `viewrpt.cwr`, hosted by the WCA or WCS. The Crystal Web Request is executed internally through viewer code on the application server. The viewer code communicates with the framework in order to retrieve a report page in .epf format from the Cache Server and Page Server. If they haven't already done so, users are prompted to download and install the appropriate viewer software.

Report viewing with the Cache Server and Page Server

Upon receiving a report-viewing request, the Cache Server checks to see if it has the requested pages cached. Cached pages are stored as Encapsulated Page Format (.epf) files. If a cached version of the .epf file is available, the Cache Server checks with the Crystal Management Server (CMS) to see if the user has rights to view the report. If the user is granted the right to view the report, the Cache Server sends the .epf file to the application server.

If a cached version of the .epf file is unavailable, the Cache Server requests new .epf files from the Page Server. The Page Server retrieves the report from the Input File Repository Server, first checking with the CMS to see if the user has rights to view the report.

If the report is an instance, and the user only has View rights, the Page Server will generate pages of the report instance using the data stored in the report object. That is, the Page Server will not retrieve the latest data from the database. If the report is an object, the user must have View On Demand rights to view the report successfully (because the Page Server needs to retrieve data from the database).

If the user has sufficient rights, the Page Server generates the .epf pages and forwards them to the Cache Server. The Cache Server then caches the .epf files and sends them to the application server.

If the initial request was made through a Crystal Server Page (`viewreport.csp`), the viewer SDK (residing on the application server) is used to generate HTML that represents both the DHTML viewer and the report itself. The HTML pages are then returned through the web server to the user's web browser. If the initial request was made through a Crystal Web Request (`viewrpt.cwr`), the application server forwards the .epf pages through the web server to the report viewer software in the user's web browser.

Report viewing with the Report Application Server

Upon receiving a report-viewing request, the RAS checks to see if it has the requested report data in cache. (The RAS has its own caching mechanism, which is separate from the Cache Server.) If cached report data is available, the RAS checks with the CMS to see if the user has rights to view the report. If the user is granted the right to view the report, the RAS returns .epf pages to the application server.

If a cached version of the page is unavailable, the RAS retrieves the report from the Input File Repository Server, first checking with the CMS to see if the user has rights to view the report. The RAS then processes the report and returns the .epf pages to the application server.

If the user is granted View rights to the report object, then the RAS will only ever generate pages of the latest report instance. That is, the RAS will not retrieve the latest data from the database. If, however, the user is granted View On Demand rights to the report object, then the RAS will refresh the report against the database.

Note: The interactive search and filter features provided by the Advanced DHTML viewer are available only if the user has View On Demand rights (or greater) to the report object.

When the application server receives the .epf pages from the RAS, the viewer SDK is used to generate HTML that represents both the Advanced DHTML viewer and the report itself. The HTML pages are then returned through the web server to the user's web browser.

What happens when you schedule a report?

When you schedule a report, you instruct Crystal Enterprise to process a report object at a particular point in time, or on a recurring schedule. For example, if you have a report based off of your web server logs, you can schedule the report to run every night on a recurring basis.

Tip: Crystal Enterprise also allows you to schedule jobs that are dependent upon other events. For details, see the *Crystal Enterprise Administrator's Guide*.

When a user schedules a report using the Crystal Enterprise web desktop, the web desktop sends the request to the application tier.

- In a Crystal Enterprise system that uses the COM SDK, the web server passes the web desktop request to the Web Connector. The Web Connector then passes the request to the Web Component Server (WCS), which communicates with the rest of Crystal Enterprise. Since the request was to schedule a report, the WCS passes the request to the Crystal Management Server.
- In a Crystal Enterprise system that uses the Java SDK, the web server passes the web desktop request directly to the application server. The request is evaluated by the Java SDK. Since the request was to schedule a report, the SDK passes the request to the Crystal Management Server.

When the CMS gets the request, it checks to see if the user has sufficient rights to schedule the report. If the user has sufficient rights, the CMS schedules the report to run at the specified time(s). When the time occurs, the CMS passes the job to the Report Job Server. The Report Job Server retrieves the report from the Input File Repository Server and runs the report against the database, thereby creating an instance of the report. The Report Job Server then saves the report instance to the

Output File Repository Server, and tells the CMS that it has completed the job successfully.

Tip: For details about multiple time zones, see the *Crystal Enterprise Administrator's Guide*.

Note:

- The Cache Server and the Page Server do not participate in scheduling reports or in creating instances of scheduled reports. This can be an important consideration when deciding how to configure Crystal Enterprise, especially in large installations. See the section on scaling your system in the *Crystal Enterprise Administrator's Guide*.
- When you schedule program objects or object packages, the interaction between servers follows the same pattern as it does for reports. However, program objects are processed by the Program Job Server.
- Users without schedule rights on an object will not see the schedule option in Crystal Enterprise.

Choosing between live and saved data

When reporting over the Web, the choice to use live or saved data is one of the most important decisions you'll make. Whichever choice you make, however, Crystal Enterprise displays the first page as quickly as possible, so you can see your report while the rest of the data is being processed.

Live data

On-demand reporting gives users real-time access to live data, straight from the database server. Use live data to keep users up-to-date on constantly changing data, so they can access information that's accurate to the second. For instance, if the managers of a large distribution center need to keep track of inventory shipped on a continual basis, then live reporting is the way to give them the information they need.

Before providing live data for all your reports, however, consider whether or not you want all of your users hitting the database server on a continual basis. If the data isn't rapidly or constantly changing, then all those requests to the database do little more than increase network traffic and consume server resources. In such cases, you may prefer to schedule reports on a recurrent basis so that users can always view recent data (report instances) without hitting the database server.

For more information about optimizing the performance of reports that are viewed on demand, see the "Designing Optimized Web Reports" section in the *Crystal Reports User's Guide* (version 8.5 and later).

Tip: Users require View On Demand access to refresh reports against the database.

Saved data

Report instances are useful for dealing with data that isn't continually updated. When users navigate through report instances, and drill down for details on columns or charts, they don't access the database server directly; instead, they access the saved data. Consequently, reports with saved data not only minimize data transfer over the network, but also lighten the database server's workload.

You can schedule these reports within Crystal Enterprise so that they automatically refresh from the database on a predetermined basis. For example, if your sales database is only updated once a day, or once a week, then you can run the report on a similar schedule. Sales representatives then always have access to current sales data, but they are not hitting the database every time they open a report.

Tip: Users require only View access to display report instances.

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