

User's Guide

Crystal Reports

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For fast and accurate help, please have the following ready when you contact McAfee:

- Program name and version number
- Type and brand of your computer, hard drive, and any peripherals
- DOS type and version
- Network name, operating system, and version
- Contents of your AUTOEXEC.BAT, CONFIG.SYS, and system LOGIN script
- Specific steps to reproduce the problem.

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Getting Started


Before You Begin

Before installing Crystal Reports, you must have Microsoft Windows, Version 3.1 or higher, Windows for Workgroups, or Windows 95 installed on your computer. Consult the Microsoft User's Guide for instructions on installing these programs.

Use the DOS DISKCOPY command to make a copy of the original Crystal Reports disks (see your DOS manual for instructions). Store your original disks in a safe place and use the copies to install the program.

Installing Crystal Reports

Follow the procedure below to install Crystal Reports.

Step	Action
1.	Insert the Crystal Reports Program disk in the appropriate floppy disk drive.
2.	Make certain that the Windows Program Manager is active. When it is, select the File menu, and then select the Run command from that menu. <i> In Windows 95, use the Taskbar/Start/Run option.</i>
3.	When the Run dialog box appears, type the following: A:SETUP (if your Crystal Reports Program disk is in drive A:) or B:SETUP (if your Crystal Reports Program disk is in drive B:).
4.	Select OK or press ENTER to call up the Crystal Reports installation program. The Installation Options dialog box appears.

During the install procedure, you will be given the choice to have the Setup program do an Automatic installation or a Custom installation. If you select Automatic, Setup installs all of the Crystal Reports files to your hard drive. If you select Custom installation you will be given the opportunity to select which components of the Crystal Reports application files are installed on your system.

Upgrading from a Previous Version

If you are upgrading to Crystal Reports 4.5 from a previous version (3.0, 4.0, Crystal Reports for Visual Basic, etc.), the installation routine ensures that there will be no conflict between different versions of the program running on the same machine. When it finds a previous version of Crystal Reports on your system, the Setup application:


- Installs Crystal Reports 4.5 to the directory you specify.
- Installs the new CRPE.DLL into the WINDOWS\SYSTEM directory.
- Installs the PD*.DLLs, VX*.DLLs, and several other DLL files required by Crystal Reports into the Windows\Crystal directory.
- Finds any previous versions of these DLLs and moves them to the \Windows\Crystal directory and changes their extensions from *.DLL to *.old. If, for some reason, you need to use the older versions of the files later on, you only need to rename them with the original .DLL extension.
- Installs any common third party DLLs such as CTL3DV2.DLL or WBTR-CALL.DLL to the WINDOWS\SYSTEM directory.

This upgrade procedure makes it unnecessary to change your AUTOEXEC.BAT file.


Installing on a Network Workstation

If you are operating a network workstation that runs Windows locally, and Crystal Reports is already installed on your network, you do not need to install Crystal Reports to your workstation. Instead, you must run the workstation setup application that was installed with Crystal Reports.

Workstation setup (SETUP.EXE) is installed in the CRW\WKCSETUP directory on the network drive on which Crystal Reports was installed. Follow the procedure below to set up your workstation.

- | Step | Action |
|------|--|
| 1. | From Program Manager, Select File/Run . |
| | Response: The Run dialog box appears. |
| 2. | In the Run dialog box, select the drive and directory in which Workstation setup resides and run the SETUP.EXE application. |
| |  <i>In Windows 95, use the Taskbar/Start/Run option.</i> |
| 3. | Follow the directions on screen to set up your workstation. |

Workstation setup configures your workstation and copies several files to your local drive. When Workstation setup is finished, you can access Crystal Reports as you would any other application on your network.

 *If you are installing Crystal Reports on a stand alone machine, you may want to perform a custom installation instead of a complete installation. A complete installation will install the Workstation install files which are not needed for a stand alone machine. These files will take up 5790K of memory. If you convert to a workstation at a later time, you can once again perform a custom installation and install only the Workstation install files.*

Starting Crystal Reports

Before you start Crystal Reports 4.5 for the first time, be sure to open and review the Readme Help file. This Help file contains important information about running Crystal Reports in certain environments, distributing applications that access the Crystal Reports Print Engine, the most recent updates or changes to the Crystal Reports documentation, and many more items of interest important to running the application successfully.

To start Crystal Reports from Windows, select the group window that holds the Crystal Reports icon.

- If you're using a mouse, double-click the Crystal Reports icon to start the program.
- If you're using the keyboard, use the arrow keys to select the icon and then press ENTER.

You can also start Crystal Reports from within Windows by double-clicking on the file name CRW.EXE in the File Manager (Explorer in Windows 95).

Configuring Crystal Reports to work like you do

Crystal Reports lets you customize many of the program's default settings to fit the way you work. These settings can affect:

- Your working environment
- The way you select databases
- SQL and ODBC access
- The way various data types are formatted
- The fonts you use for fields and text.

To change your default settings, select **File/Options** and the Options dialog box appears. Then you can select the tab appropriate to the option you want to change, as in the examples below. With the options feature these changes are easy to make.

Configuration examples

When configuring Crystal Reports you may want to specify the default data directory that is used when creating new reports, and what kinds of databases will be listed in the Choose Database File dialog box whenever it appears. For complete descriptions of all configuration options, search for *File Options command* in Crystal Reports Help.

Specifying a default data directory

Follow the procedure below to specify a default data directory.


Step	Action
1.	Select the Database tab in the Options dialog box.
	Response: Database options appear.
2.	Specify your default directory using one of the following methods: <ul style="list-style-type: none">▪ Type the full path in the Data Directory box (C:\CRW for example)▪ Click the Browse button, make your selection using the Set Directory box when it appears.
3.	Click OK when finished to return to Database options.

Specifying databases in the Choose Database File dialog

When you specify the kinds of databases to be listed in the Choose Database File dialog box, you limit the kinds of files listed. You may choose to do this when you are only working with one or two kinds of databases and you want only those kinds to be available in the File Name scroll box. Follow the procedure below to specify the kinds of databases listed in the Choose Database File dialog.

Step	Action
1.	Select the Database tab in the Options dialog box.
	Response: Database options appear.

2. In the Database Selector edit box, type in the filename extensions for the kinds of databases you want listed in the Choose Database File dialog box.
3. Click OK when finished to return to Database options.

 *When entering filename types (*.db;*.ddf; *.ovd, etc.) in the Database Selector box you must: place an asterisk before the extension, and a semicolon between file types.*

Specifying a Data Dictionary as your primary data source

To specify a Data Dictionary as your primary data source requires you to:


- Select Crystal Dictionary as your primary data source, and then
- Select the specific dictionary you want to use as a default.

This requires you to work with two of the Option tabs: **New Report** and **Database**. Follow the procedure below to select Crystal Dictionaries as your primary data source.

Step	Action
1.	In the Options dialog box, select the New Report tab. Response: New Report options appear.
2.	In the 'Prefer to create new Reports From:' section, select Crystal Dictionaries.
3.	Select the Database tab. Response: Database options appear.
4.	In the Default Dictionary section, Click the Browse button. Response: The File Open dialog box appears.

5. Select the Crystal Dictionary you wish to use as the default (pro-samp.dct, for example) and Click OK when finished to return to Data-base options.
6. Click OK again to return to the program.

Now, whenever you begin a new report, the program takes you directly to your default dictionary.

 *If you deactivate the Report Gallery using the Use Report Gallery for New Reports switch on the New Reports tab, the program will take you directly to your default dictionary each time you begin a new report.*

Specifying the default view when previewing your report

The default view is the view that Crystal Reports will use when you view your report in the Preview Window. After the report has been displayed in the default view, you can select a different view if necessary. Follow the procedure below to specify the default view used when you preview your reports.

Step

Action

1. Select the Layout tab in the Options dialog box.

Response: The Layout options appear with Preview Pages options in the lower left hand corner of the tab. The options are **Fit Size**, **Fit Width**, and **Fit Page**.

2. Select one of the three choices to specify the default view you want Crystal Reports to use when you view pages in the Preview Window.
3. Click OK to return to the program.

Now each time you view a report in the Preview Window Crystal Reports will start with the option you selected.

Specifying the default fonts for each section of your report

Follow the procedure below to specify the default fonts for each section of your report.

Step

Action


1. Select the Font tab in the Options dialog box.

Response: Font options appear with two vertical rows of buttons; one row for changing Default Field Fonts, and the other row for changing Default Text Fonts.

2. Click the button corresponding to the section you wish to change the default font for.

Response: The Font dialog box appears.

3. Select the desired font, style and point size to be used as the default, and Click OK when finished to return to Font options.

 *For each section that you want to change the default font for, repeat steps 2 and 3 above.*

4. Click OK again to return to the program.

Now each time you use a Field Font or a Text Font that you changed the section default for, the font you selected will be used in that section. All the fields and text you place in each section of your report will appear using the default fonts you specified for that section.

Specifying a SQL/ODBC Server as your primary data source

To specify a SQL/ODBC Server as your primary data source you must:


- Set the Prefer to Create new reports from SQL tables option
- Select the Server Type

- Select the Skip Server Type Dialog
- Enter the Server Name, Database, and User ID.

This requires you to work with two of the Options tabs: **New Report** and **SQL**. Follow the procedure below to specify a SQL/ODBC Server as your primary data source.

Step	Action
1.	Select the New Report tab in the Options dialog box. Response: New Report Options appear.
2.	Select Prefer to create new reports from SQL Tables.
3.	Select the SQL tab in the Options dialog box. Response: SQL options appear.
4.	Use the Server Type drop down edit box to select the Server Type. Click the Server type you will be using as your primary data source. Response: The data source appears in the edit box.
5.	Toggle the Skip Server Type Dialog checkbox on. Response: Now, when creating a new report from the selected server, the Server Type Dialog will not be shown before you log onto the server.
6.	Position the mouse pointer inside the Server Name edit box. Click once, and enter the Server name.
7.	Position the mouse pointer inside the Database edit box, Click once, and enter the Database name.
8.	Position the mouse pointer inside the User ID edit box, Click once, and enter your User ID.
9.	Click OK to return to the program.

You can turn off Use Report Gallery for new reports after specifying a SQL/ODBC Server as your primary data source. If you do, when you begin a new report you will bypass the Report Gallery and go straight to the SQL dialog box. To turn off Use Report Gallery, follow the procedure below:

- | Step | Action |
|-------------|--|
| 1. | Select the New Report tab in the Options dialog box. |
| | Response: New Report options appear. |
| 2. | Turn off “Use Report Gallery for new reports” by Clicking on the checkmark. |
| 3. | Click OK to return to the program. |
| |  <i>If the checkmark is not visible in the checkbox, Use Report Gallery for new reports is already off.</i> |

Now when you select **File/New Report**, or the New Report button on the button bar, you go straight to the login dialog box on the server you selected. Enter the correct user ID and password to log onto the server.

Specifying a report template as your primary data source

Follow the procedure below to specify a report template as your primary data source.

- | Step | Action |
|-------------|---|
| 1. | Select the New Report tab in the Options dialog box. |
| | Response: New Report options appear. |
| 2. | Select Prefer to create new reports from Other Reports. |
| 3. | Click OK to return to the program. |

Now when you select **File/New Report**, or the New Report button from the button bar, the Select Report Template dialog box appears, listing report templates. Select the report you want to use as a template, and Click OK to open the template.


Specifying formatting field default settings

The default settings will be used for formatting fields when you begin a new report. You can specify the default settings that you will use for most of your reports. Follow the procedure below to specify the default settings Crystal Reports uses for formatting fields.

- | Step | Action |
|-------------|--|
| 1. | Select the Fields tab in the Options dialog box.

Response: Field formatting options appear. |
| 2. | Select the field type you want to change formatting options for.

Response: A dialog box appears with formatting options for the field type. |
| 3. | Make the changes you want to the default settings in the dialog box, and Click OK to return to the Options Dialog box.

 <i>For each field type you want to change default options for, repeat steps 2 and 3 above.</i> |
| 4. | Click OK to return to the program. |

Sample application - printing dates in your report in a certain format

As an example, if you want dates in your report to be printed in the Day/Month/Year format and you want duplicated dates not to be printed, you simply do the following:

1. Select the Fields tab in the Options dialog box.

Response: Field formatting options appear.

2. Click the Date button.

Response: The Format Date dialog box appears with Date formatting options.

3. In the Use Windows Default Format checkbox, toggle the check mark off.

This will enable you to set a new date format to be used in your reports.

4. Toggle the checkmark on in the Suppress if Duplicated checkbox.

Response: Now, when the date on a previous line is duplicated, that date will not be printed.

5. Select the DMY option in the center of the dialog box. This will print dates with Day/Month/Year formatting, for example, 1/3/95. At the bottom of the Date format box the program displays a sample of the selected Date format. Click OK to return to the Options dialog box.
6. Click OK to return to the program.

Now when you have Date fields in your report, they will be printed with Day/Month/Year formatting, and duplicated dates from previous lines will not be printed.

What's New in Crystal Reports 4.5

There are many new features in Crystal Reports 4.5. The major changes that have been implemented are described below.

32-bit technology and Crystal Reports


You can now run a 32-bit version of Crystal Reports under Windows NT and Windows 95. Most 16-bit reports can be run in the 32-bit versions of Crystal Reports depending on the datasource.

User interface

To reduce screen crowding when you have multiple open reports, Crystal Reports uses a single dynamic window for each report. Tabs in the upper left hand corner of the window enable you to toggle easily between the Design window and the Preview Window display. When you send a report to the Preview Window, the Preview tab is visible and is selected. You can Click on the Design or Preview tab to toggle between the Design and the Preview Windows.

Formatting

Take advantage of 12 basic styles, or totally advanced graphing with over 80 styles and editing control in the 16-bit version. Control every aspect of graphs in a report. It's a snap to rotate a graph, changing its perspective, or adjust font size or colors. Graphs are easy to insert, and get updated whenever data is refreshed. Graphing options can be controlled at runtime, and you can now drill down directly on graphs to view detailed data.

 *Graph work created in 16-bit can be read and printed in 32-bit.*

Data analysis

- **Export in Excel 5.0 format**
In Crystal Reports, you can now export information directly to Excel 5.0 format.

- **Reporting with Lotus Notes**

Crystal Reports now give you the ability to create reports importing Lotus Notes (via ODBC) and to export to the Lotus Notes format. (16-bit versions only)

- **Improved MS Access Support**

Crystal now offers better reporting with support for Access OLE objects. Report on the information you want, including Access Pictures fields and OLE fields. Save time and effort by using Access queries to generate reports.

Data handling

Report Options saved with report

The new **File/Report Options** command enables you to save a number of option settings with your report. This can make it easier to deploy reports across machines and throughout an organization.

New developer resources

- **Print Engine DLL in 32-bit**

Now access the full power of Crystal Reports in 32 or 16-bit technology so you can develop and report in any Windows environment. There is full compatibility between both technologies, allowing you to create applications that are truly cross-platform.

- **Full Featured OLE Control**

Crystal now has a new OCX with over 80 properties for full access to the Crystal Print Engine DLL. The new tabbed interface makes it really easy to navigate around the properties page. You now have numerous report integration options including the OCX, the Crystal VBX, the Delphi VCL or the MFC. Development has never been easier.

- **Reporting from the NT event log**

Use Crystal Reports to report on the Windows NT event log. Monitor and analyze workstation or system related activity. An IS favorite!

- **Delphi VCL**

Now you can add reporting to your Delphi applications. Crystal's VCL allows you to take advantage of 89 properties for maximum control and runtime flexibility.

- **Borland Database Engine (IDAPI) and Support for Paradox 5.0**

Crystal Reports now supports the Borland Database Engine for faster reporting performance from dBASE and Paradox 5.0.

Crystal Reports 4.5 New Feature List

The following tables show what features are available in the various versions of Crystal Reports 4.5, and are subject to change.

Further, the table uses the following key:

- **Prf. 32**
Professional (32-bit)
- **Prf. 16**
Professional (16-bit)
- **Std. 32**
Standard (32-bit)
- **Std. 16**
Standard (16-bit)
- **One Asterisk (*)**
32-bit ready. Requires component not currently available from third party vendor.
- **Two Asterisks (**)**
Paradox via ODBC.

New 4.5 Features	Prf. 32	Prf. 16	Std. 32	Std. 16
OLE Control (OCX)	>80	>35	>35	>35
32-bit Print Engine DLL	>80	>80	>35	>35
Drilldown on graphs	Yes	Yes	Yes	Yes
Graphing customization	*	Yes	*	Yes
Export to Lotus Notes data	No	Yes	No	Yes
Delphi Control (VCL)	No	>89	No	No
Reports from the NT Event Log (NT Only)	Yes	No	Yes	No

New 4.5 Features	Prf. 32	Prf. 16	Std. 32	Std. 16
Improved MS Access support	Yes	Yes	Yes	Yes
Export to MS Excel 5.0 format	Yes	Yes	Yes	Yes
Report Options saved with report	Yes	Yes	Yes	Yes
Downward compatibility with reports	Yes	Yes	Yes	Yes

PC Data Access	Prf. 32	Prf. 16	Std. 32	Std. 16
ASCII	Yes	Yes	Yes	Yes
ACT! 2.0	No	Yes	No	Yes
Btrieve (all indices, requires DDF's)	No	Yes	No	Yes
Clipper (NYX)	Yes	Yes	Yes	Yes
dBASE (NDX, MDX, Visual dBASE and QBE) (QBE 16-bit only)	Yes	Yes	Yes	Yes
FoxPro (IDX, CDX, Visual FoxPro)	Yes	Yes	Yes	Yes
Microsoft Access (1.0 - 2.0) and Access Queries	Yes	Yes	Yes	Yes
Microsoft Excel	Yes	Yes	Yes	Yes
Paradox (3.5 - 5.5)**	Yes	Yes	Yes	Yes
Lotus Notes	No	Yes	No	Yes

SQL Data Access	Prf. 32	Prf. 16	Std. 32	Std. 16
Borland Database Engine (IDAPI)	*	Yes	No	Yes
ODBC	Yes	Yes	No	No
Gupta SQL Base	*	Yes	No	No
IBM DB2/2	No	Yes	No	No
MS SQL Server	Yes	Yes	No	No
Oracle	*	Yes	No	No
Scaleable SQL	*	Yes	No	No
Stored Procedure support	*	Yes	No	No
Ability to sort data on SQL Server	Yes	Yes	No	No
Case sensitive SQL data	Yes	Yes	No	No
Ability to convert data-base drivers	Yes	Yes	Yes	Yes


Quick Start

If you are an experienced Windows user who wants to get right into the program, follow these steps to set up a report for the first time.

Step

Action

1. Start Crystal Reports by double-clicking on the Crystal Reports icon in the Program Manager, or in Windows 95, select the Crystal Reports item from the Crystal Reports Folder on the task bar.

 *In Windows 95, Crystal Reports may also appear in an open folder on the Desktop shell when it is installed.*

2. Select **File/New/Report**.

Response: The Report Gallery appears.

3. Select one of the eight Expert icons to build a report with the help of an Expert, select the Another Report icon to use a template for building your report, or click Custom to build a custom report. If you click Custom, the Report Gallery expands, and you can then select a Report Type and Data Source for your custom report.

Response: If you have selected Custom and have selected a Report Type and Data Source, the Choose Database File dialog box appears.


4. When the Choose Database File dialog box appears, select the first database you want to activate for your report and click OK when finished.

Response: The Crystal Reports Report Design window appears with **Title**, **Page Header**, **Details**, **Page Footer** and **Summary** sections set up on your report template. The sections are all blank initially. You create your report by inserting and formatting items in each of these sections.

The Insert Database Field dialog box appears on screen with the Design window. This dialog box displays a list of all of the fields in the active database. To speed the entry of multiple fields, the box remains on screen until you click the Done button. You can move the dialog box to a new location if you wish.

5. Select the field(s) you want to appear on the report. You can select and place them one at a time, or you can use the SHIFT-CLICK combination to select a number of contiguous fields or the CTRL-CLICK combination to select fields from the list at random. With the cursor on one of the selected fields, click the left mouse button. While keeping it depressed, drag the selected field(s) to the point in the Details section where you want the first field to appear.
6. Release the mouse button to place the field(s). If you placed multiple fields, they will appear next to each other in the order they appear in the Insert Database Field dialog box. The program marks the position of each field with a rectangular box. The characters in the box indicate whether the field is text (xxx...), number (555...), currency (\$555...), date (YYYY-M...), or Boolean (T/F). The number of characters in the box indicates the number of characters allowed for the field in the database. Note also that the program automatically places field titles in the Page Header section.
7. To create a report title, select **Insert/Text Field**, type in the information you want to appear, click Accept when finished, and position the field where you want it in the Title section. You can also insert database fields or special fields in that section from the Insert menu.
8. To see how your results will print, select Print Preview from the File menu. You can fine tune your report in the Preview Window if you wish while seeing the results on actual report data. You can also close the window and continue working on your report in the Report Designer. The functionality is the same in both places.
9. If you want to:
 - ❑ Change the placement or width of a field.
 - ❑ Format the field.
 - ❑ Insert a subtotal or grand total for a field.
 - ❑ Delete a field.


- Click the field box for that field. Black handles appear on the right and left sides of each selected field.

-  *You can select multiple fields at once using a SHIFT-CLICK combination, or by selecting **Edit/Select Fields**. If you use **Edit/Select fields**, you use the crosshair cursor to surround the field(s) of interest in a selection rectangle (lasso).*


- To change the placement of the field, drag the field box to its new position using the mouse or the arrow keys.

- To change the width of the field, drag the right or left handle using your mouse or use a SHIFT-ARROW combination on your keyboard.

- To format or subtotal the field, click the right mouse button while the cursor is inside the field. A pop-up menu appears listing your various options.
 - To change the font, select **Change Font** and refine your selection using the Font dialog box when it appears.
 - To change the format (alignment within field, number, currency, and date display, etc.) select **Change Format** and refine your selection using the Format dialog box when it appears.

-  *Many of the font and formatting options are now available on the Format bar just below the Button bar.*

- To insert a subtotal, select **Insert/Subtotal** and refine your selection using the Insert Subtotal dialog box when it appears. In this dialog box you select the field and the condition that triggers a new subtotal whenever the field's value changes, and you select the sort direction: Ascending (A to Z, 1 to 9) or Descending (Z to A, 9 to 1). The program creates a new section to hold the subtotal.

-  *The program automatically sorts the data (based on the field that triggers the subtotals) before it subtotals. You don't have to manually enter a subtotal sort.*

- ❑ To insert a grand total, select **Insert/Grand Total**. The program creates a new section to hold the grand total.
 - ❑ To delete the field, select **Delete Field**.
- 10. If you want to create a formula to make data calculations or comparisons, select **Insert/Formula Field**. Enter a name for your formula in the Insert Formula dialog box, and the formula itself in the Formula Editor when it appears. Enter fields, operators, and functions by selecting them from their respective scroll lists. You can get complete information on each available Function and Operator via the Help button, and you can check your formula syntax via the Check button. Entering a formula is similar to entering a formula in a spreadsheet cell. When finished editing, select Accept and place the formula just like you do a database field.
- 11. To add a graph, select **Insert/Graph/Chart**.
- 12. To insert a spreadsheet, picture, or other OLE object that you can edit in its native application from Crystal Reports, select **Insert/Object**.
- 13. To change the sort order, select **Report/Sort Records**. Select the field(s) you want Crystal Reports to use for sorting the report data.
- 14. To change the sort and group by field, select **Report/Change Group**. Select the group section of interest from the list that appears in the Edit Group Section (sections) dialog box, and select the new “trigger” field from the Edit Group Section (edit) dialog box when it appears.
- 15. If you want to limit your report to specific records (for example, the records of California customers that have YTD sales greater than \$10,000), click the first field on which you want your selection to be based (in this case the State field) and choose Select Records Expert from the Report menu or the right mouse button pop-up menu. Answer the questions that appear in the Select Records Expert dialog box and click OK when finished.
- 16. When finished, print your report by selecting **File/Print/Printer**.

That's it. It's that easy to build a report with Crystal Reports. To practice using Crystal Reports by completing step-by-step lessons, proceed to [Chapter 4, “Tutorial—Movie List.”](#) To read about Crystal Reports concepts and procedures in greater detail, see [Chapter 3, “Using Crystal Reports.”](#)

About Crystal Reports

Crystal Reports is a powerful yet easy to use program for creating custom reports, lists, and labels using data from your existing databases. The program works by establishing connections with one or more of your databases. Using these connections as conduits, Crystal Reports draws in the values from database fields you select and uses them in the report, either in their original form or as part of a formula that generates more sophisticated values.

Crystal Reports was designed to work with all kinds of data: numbers, currency, text, dates, and boolean (Yes/No) fields. It has a wide range of built-in tools that you can use to manipulate that data to fit your needs. Using these tools, you can:

- Make calculations and comparisons of data values.
- Calculate subtotals, and grand totals of field values.
- Calculate group averages, count the records in a group, and test for minimum and maximum values.
- Test for the presence of specific values.
- Present data only if certain conditions are met.
- Evaluate logical relationships between values.
- Convert data from one type to another.
- Merge text with other text.
- Merge text with data field data.
- Perform numerous other useful, data-related activities.

You can place the data wherever you want it on the report, and highlight it with special fonts and font sizes. With Crystal Reports, your reports can be as simple or as complex as your needs demand.

Once you have designed a report (or modified one of the sample reports shipped with Crystal Reports), you can use it as a template to create other similar reports. You can then use the template as a starting point for your new report, making only those changes necessary to fit your needs. This feature can save you considerable time over creating a new report from scratch.

If you can imagine a report, you can probably create it using Crystal Reports, and save a lot of time and headaches in the process.

Use as a print engine with Visual Basic, C, and dBASE

Crystal Reports can also be used as a print engine to print reports from within your C, Visual Basic, and dBASE application. In fact, it can be used as a print engine by any development tool that can call a DLL. See Chapter 3 in the *Developer's Reference*, "The Crystal Reports Print Engine," for complete details.

Why Crystal Reports

Crystal Reports was created to allow technical and non-technical users to create customized reports quickly and easily, from a variety of databases, under Microsoft Windows. While database programs often include their own report writers, they typically require extensive knowledge of the database they come with. Crystal Reports, instead, was designed to be used by anybody. It includes tools that can be used by:


- Businesses, and Administrative organizations
- Schools
- Clubs, Sports teams or leagues
- Collectors
- Libraries
- Professionals
- Individuals
- Anyone who has a need to retrieve database data and present it in a list, report, or label format.

And, Crystal Reports was designed to get you up and running quickly, *even if you're not a computer expert.*

How Crystal Reports prepares reports

Crystal Reports prepares reports by reading data in the database files you have selected and making that data available for use in your report.

- If you wish to use data in a single data file, you simply choose that file when you create the report.
- If you wish to use data in multiple data files, you need to select the files and also to indicate the field or fields in each file that Crystal Reports is to use to match data. For example, you may wish to create a report that draws data from both your customer database and your invoice database. The customer database contains personal information on each customer; the invoice database contains information on invoices and payments. To use the two databases effectively, Crystal Reports needs to know how to match invoice and payment data in the one database to the appropriate customer in the other. The linking field might be a field called CustNumber in both databases, or, it could be a field named CustNumber in one database and a field named Account in the other. Once the linking field is identified, Crystal Reports matches up the data.

 *Crystal Reports does not write data to your original data files. Your original files remain unchanged using Crystal Reports, no matter how much you might manipulate the data you select.*

Things you can do with Crystal Reports

The term *report writer* doesn't completely describe Crystal Reports' functionality. Crystal Reports creates attention-getting management reports with ease, that's true. But it has many other uses not often suggested by the term *report writer*. Below are some examples of the projects you can complete with Crystal Reports.

- **Lists and reports**

You can create simple columnar lists from a single database or you can create a report that includes data from different sources, that subjects the data to extensive calculations, that merges text with data, and that highlights key data with display fonts and other character attributes. (See [Chapter 3, "Using Crystal Reports,"](#) and [Chapter 4, "Tutorial—Movie List,"](#) of this manual, and Private Tutor.)

- **Cross-tabs**

You can create cross-tab reports that enable you to make comparisons and identify trends in a hurry. (Search for *cross-tab* in Crystal Reports Help and Private Tutor.)

- **Graphs/Charts**

You can create graphs and charts in a variety of formats to help you present elements of your report in a more visual manner. (Search for *graphs and charts* in Crystal Reports Help.)

- **Label-type items**

You can create mailing labels with your data, and you can also create name tags, rotary file cards, disk labels, and other similar label type items that are available for dot matrix or laser printers. (Search for *mailing labels* in Crystal Reports Help and Private Tutor.)

- **Form letters**

You can create customized form letters that simply draw data from a database for an address and salutation, or you can create sophisticated letters that include different blocks of text depending on relationships found in the data. (Search for *form letters* in Crystal Reports Help.)

- **Preprinted forms**

You can create reports (invoices, etc.) that print directly on preprinted forms. (Search for *preprinted forms* in Crystal Reports Help.)

- **Data analyses**

You can analyze mountains of data in multiple databases to identify needle-in-a-haystack items. You can assign priority numbers to alternatives or flag the items of greatest interest.

- **Invoices**

You can create custom invoices to be printed as a batch on specific dates, or you can construct a point of sale system that generates an invoice on demand, once the appropriate data is entered. (Search for *invoices* in Crystal Reports Help.)

- **Instructions**

To create an addendum to an invoice, you can have Crystal Reports generate personalized instruction lists or print personalized sell-up suggestions based on the specific items ordered.

- **Job descriptions**

You can have Crystal Reports generate personalized job descriptions based on the job number to which a person is assigned.

Additional things you can do

Within a report, Crystal Reports gives you the ability to:

- **Calculate data**

You can perform simple arithmetic on your data, or you can perform complex statistical, financial, or scientific calculations. This allows you to present data in its final form and not in a form that requires further manipulation once the report is in hand. (Search for *calculated data fields* in Crystal Reports Help.)

- **Compare data**

You can compare one data field value to another, or you can compare the calculated value of a complex calculation to the calculated value of another complex calculation. This allows you to include data in your report only if a certain condition is met (a is greater than b, c is not equal to d, etc.). (Search for *comparison operators index* in Crystal Reports Help.)

- **Search for specific values**

You can search for specific data in your report by using the search feature in Crystal Reports. (Search for *Search command* in Crystal Reports Help.)

- **Drill Down**

You can see the details behind the summarized values in summary reports using the Drill Down feature. (Search for *drill down* in Crystal Reports Help.)

- **Test for logical relationships**

You can test to see if a group of conditions is met. Using such a test (created with the logical operators *and*, *or*, and *not*) you can create complex, multi-faceted sets of conditions to pinpoint data for inclusion into your report. (Search for the operator names in Crystal Reports Help.)

- **Convert data**

You can convert numbers to dollar amounts, numbers to text, or numbers written as text to numbers. You can also convert values with decimal places to integers. This conversion ability gives you great flexibility in the data you can use in formulas or calculations. (Search for *convert* in Crystal Reports Help.)

- **Combine data with freeform text**

You can combine data from data fields with freeform text to create sentences that can be personalized and customized, or to flag, introduce, or label data. (Search for *form letters* in Crystal Reports Help.)

Easy to use features of Crystal Reports

Crystal Reports has been designed with your needs firmly in mind. You get power, but you also get ease of use and flexible distribution:

- **Fine tune your report using actual data**

You can adjust spacing, fonts, and field sizes while working on actual data. You can regroup your data and add summaries and see the changes as they take place. And you can do all this without having to rerun your report after every change. It's an efficient process. (Search for *Preview Window* in Crystal Reports Help.)

- **Reformat your report with the Click of a button**

You can change fonts, font size, and weight, realign data, modify number formats, and make a number of other formatting changes from the Format bar. This boosts your efficiency and makes it easier for you to experiment with formatting changes. Additionally, you can use the Auto Arrange button to automatically adjust the spacing of fields on your report. (Search for *format bar* in Crystal Reports Help.)

- **Edit graphics, charts, and other objects in their native applications**

Since Crystal Reports is an OLE 2.0 container application, you can insert OLE objects (pictures, graphs, spreadsheets, etc.) in your report. You can set them up so they update whenever the original is changed, and you can edit the objects in their native applications simply by double-clicking the object. (Search for *OLE* in Crystal Reports Help.)

- **Create executable reports**

You can create executable versions of your finished reports. This enables others to read your reports with the click of an icon, even if they don't have Crystal Reports on their systems. (Search for *compile report command* in Crystal Reports Help.)

- **Export reports**


You can export your finished reports to a number of popular spreadsheet, and word processor formats, and into a number of common data interchange formats as well. This makes the distribution of information easier. For example, you or your colleagues may want to use report data to project trends in a spreadsheet package or enhance the presentation of data in a desktop publishing package. (Search for *export command* in Crystal Reports Help.)

- **Send your reports via E-Mail**

You can distribute your reports quickly and easily by delivering them via e-mail. Electronic distribution maximizes efficiency by eliminating print queues and reducing printer traffic. (Search for *email, sending report via* in Crystal Reports Help.)

Databases that work with Crystal Reports

Crystal Reports can build reports using the standard data files generated by dBASE (III, III+, IV, V), dBASE for Windows, Paradox (up to and including version 5), Paradox for Windows, FoxPro (2.0, 2.5), Clipper, Btrieve (5.0-6.5, through the use of .ddf (dictionary) files, Excel, and Microsoft Access (1.0-2.0). The program can also work with ASCII data if you define the field lengths using the ODBC Administrator that is installed when you install the program. Since many programs can export data in dBASE format (.dbf files) or ASCII format, you will find that you can use Crystal Reports to create reports for virtually any database. Crystal Reports Professional Edition works with many of SQL and ODBC databases as well. (Search for *databases that work with Crystal Reports* in Crystal Reports Help.)

 *In the 32-bit version of Crystal Reports 4.5, Btrieve files are only supported in Windows NT. Paradox databases are not supported in the 32-bit version of Crystal Reports 4.5. ACT files are not supported in the 32-bit version of Crystal Reports 4.5.*

The Crystal Reports window

The Crystal Reports window is clean and easy to understand:

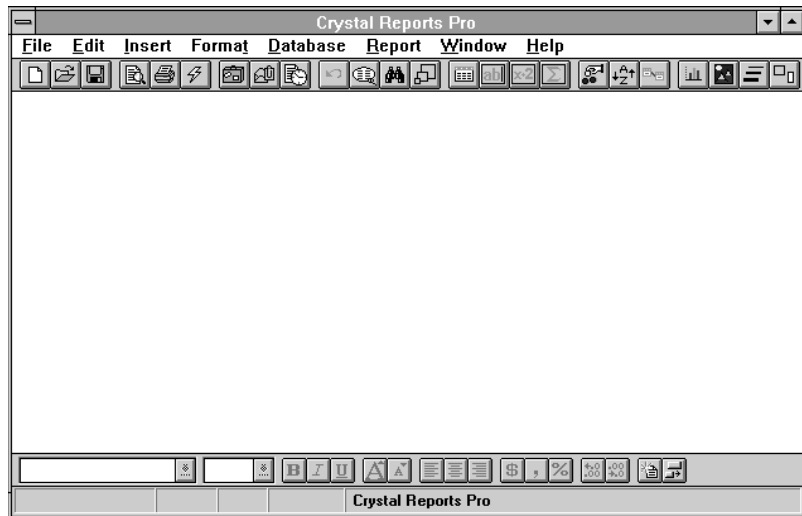


Figure 2-1. The Crystal Reports window

- The Menu bar appears just below the Title bar
- The Button bar appears just below the Menu bar
- The Format bar appears just above the Status bar
- The Status bar appears at the bottom of the window.

The Menu bar

The Menu bar is Crystal Reports' command center. Each option on the menu bar calls up a drop down menu of commands that you can use to create, modify, print, and save your reports.

- **File.** The File menu includes commands you can use to open, close, and save files, save files under a different file name, and create new reports, mailing labels, and cross-tabs. It also includes a command you can use to exit Crystal Reports. Additionally it contains commands that enable you to preview and fine tune your report before printing, to export your report to a disk file in a variety of formats, to send your report to a printer, to print the report definition (a report describing your report), to change page margins and label layout, and to select a printer if you want the report to print on something other than the default printer. One remaining command enables you to configure Crystal Reports to your specifications. (Search for *File Menu commands index* in Crystal Reports Help.)
- **Edit.** The Edit menu allows you to modify aspects of your report. The menu includes commands you can use to edit formulas, text fields, summary fields, OLE Objects, and graphs, to review the data in a selected field, to edit and delete group sections, and to activate the field-selection “lasso.” It also contains commands for cutting, copying, and pasting text, and for pasting OLE objects and their associated links. (Search for *Edit Menu commands index* in Crystal Reports Help.)
- **Insert.** The Insert menu is the central menu you use for creating reports. The menu includes commands you can use to insert database fields, text fields, formula fields, subtotals, grand totals, summaries (counts, averages, etc.), group sections, print date, page number, record number group number fields, graphics, lines, boxes, graphs and OLE objects. (Search for *Insert Menu commands index* in Crystal Reports Help.)

- **Format.** The Format menu includes commands for changing the look of the elements in your report. It includes commands for changing fonts, and formatting fields, report sections, graphics, lines, and boxes. The menu also provides commands for adding field borders, background color, and drop shadows for your fields and for changing line height. (Search for *Format Menu commands index* in Crystal Reports Help.)
- **Database.** The Database menu is used to select and delete tables for use with your reports, to change the alias you use to identify a table, and to link and unlink tables. It has commands for logging onto and off SQL and ODBC servers, for showing and editing SQL queries, and modifying parameters for stored procedures. It also has a command, Set Location, for directing Crystal Reports to look for tables in new locations. Two verify commands can be used to adapt your reports to minor changes in table structure. (Search for *Database Menu commands index* in Crystal Reports Help.)
- **Report.** The Report menu includes commands that let you select the records or groups to be included in your report, select the order in which report data is to be sorted (by record or by group), to modify the report title or add comments to the report, and to specify a print date for your report. It has commands for updating the data used in a report and for gathering all the files you need for distributing your reports. It contains one additional command for creating an executable version of your report that you can share with others that don't have Crystal Reports. (Search for *Report Menu commands index* in Crystal Reports Help.)
- **Window.** The Window menu includes commands that let you rearrange icons and windows. It also lists the report windows that are open and includes a command that lets you close all report windows at once, if desired. (Search for *Window Menu commands index* in Crystal Reports Help.)

- **Help.** The Help menu includes commands that take you to Crystal Reports' main help index and search facility and that provide information on using the help system. It has commands for registering your version of Crystal Reports, for calling up technical information about your computer system, for creating a technical support request, and for using the Crystal bulletin board efficiently. The menu also has commands that provide information on Crystal Reports LANPAKS, the Professional version of the program, and Upgrade Express, the most efficient way to stay on top of program upgrades. One final command gives you information about the Crystal Reports version you are using. (Search for *Help Menu commands index* in Crystal Reports Help.)

The Button bar

Crystal Reports groups several commonly used commands on a Button bar that remains on screen at all times (unless you choose to turn it off using the **File/Options** command). Each command is represented by an individual button, and each button displays a graphic that visually describes the command. You activate Button bar commands by clicking the appropriate button one time with the left mouse button.

The Button bar eliminates some of the steps needed to activate the included commands, and it can thus greatly speed your work in creating reports. Each command available via the Button bar is discussed in Crystal Reports Help. (Search for *button bar*.) The buttons on the button bar perform the following functions:



Create a new report.



Open an existing report.



Save the report.



Change from the Design window to the Preview Window.



Refresh the report data.



Zoom report.



Print report to a printer.



Export report to a file.



Send the file to E-Mail.















Launch report to an Info Server.



Undo last change.



Select fields.

	Insert a database field.		Insert a text field.
	Insert a formula field.		Insert a summary field.
	Set record selection criteria.		Set record sort order.
	Visually link tables.		Search for specific values.
	Insert a Chart/Graph.		Draw a line on the report.
	Insert a picture.		Draw a box on the report.

For additional information on these buttons, search for *button bar* in Crystal Reports Help.

The Format bar

The Format bar enables you to select many popular formatting options with the click of a button or a selection from a drop-down list. You simply select the data you want to format, then click the appropriate list option or button to format the data you selected.


















Two drop down lists appear at the left side of the Format bar.



You use these for selecting new fonts and font sizes if you want to use something different than the default. To make a selection from either box, click the arrow to reveal your options and then click the option you want.

The buttons on the Format bar perform the following functions:

	Changes the selected data to boldface.		Italicizes the selected data.
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	Underlines the selected data.		Increases the font size one point each time you <i>click</i> the button.
	Decreases the font size one point each time you <i>click</i> the button.		Aligns the selected data flush left.
	Centers the selected data.		Aligns the selected data flush right.
	When a number field is selected, places a currency symbol with the number. ¹		When a number field is selected, places a thousands separator in the number. ¹
	When a number field is selected, places a percentage sign with the number.		Adds one decimal place to a number.
	Subtracts one decimal place from a number.		Applies a style.
	Arranges field spacing automatically.	¹ The program refers to your settings in the International section of the Windows Control Panel.	

The Status bar

The status bar at the bottom of the report window displays valuable information to help you use Crystal Reports more efficiently:

		3.2:3.7	volumes.Price
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- **Button bar functions.** When the cursor is over a Button bar button, the Status bar displays a short description of the button's function.
- **Menu command descriptions.** When you highlight a menu command, the Status bar displays a short description of the command. To highlight a menu command, click the menu name and move to the command using the DOWN ARROW key.
- **Current selections.** When you select or place a graphic, field, text field, graphic line or box, special field, or formula, the status bar displays the name of the item selected. It displays:
 - The file name for a graphic

- The alias and field name for a field
 - The text in a text field
 - The word Line for a line and Box for a box
 - The field type for special fields (PrintDate, RecordNumber, etc.)
 - The formula name for a formula.
-
- **Graphic coordinates.** When you select a field or create a bit-mapped graphic, a graphic box, or a graphic line, the program displays the coordinates of the object measured from the top left corner of the page. Two numbers are used, separated by a colon. The first number describes how many inches from the left page margin the graphic is. The second number describes how many inches from the top margin the graphic is. For more information about the Status bar search for *status bar* in Crystal Reports Help.

Right mouse-button capabilities

When you are working in the Design window, you can speed up your work considerably using Crystal Reports' right mouse button capabilities. When the cursor is positioned on a report element (a field, a group field, a formula, etc.) and you click the right mouse button, Crystal Reports displays a pop-up menu right next to the element. Unlike Crystal Reports' standard menus that group commands by function (editing, inserting, etc.), these pop-up menus are element-specific: that is, they contain only those commands from Crystal Reports' primary menus that are available for use with the selected element.

The pop-up menus are valuable because:

- They display the name and source (alias) of the element at the top of the menu so you can identify the elements on your report with a single mouse click.
- They appear right next to the selected element making them quicker and easier to access than Crystal Reports' main menus.
- They contain only the commands you need; you don't need to search for commands on a more comprehensive menu.
- They make it easier to learn Crystal Reports because:

- They eliminate the need to remember where to find a command, and
- Because you're dealing with only a compact list of commands, they make it easier to pick the right one, and
- They *spotlight* the things you can do with an element making it an easier system to use when you are under pressure or distracted.

Follow the procedure below to use right mouse button menu.


Step**Action**

1. Position the cursor on the element of interest.
2. Click the right mouse button.

Response: The pop-up menu appears.











3. Select the command of interest from the pop-up menu. These options work exactly like the corresponding options that appear on Crystal Reports' primary menus.


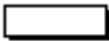



For information on using any of these menu options, search for the option name in Crystal Reports Help.

 *If you have swapped left/right mouse buttons via the Control Panel, the left mouse button will activate the pop-up menus.*

Crystal Reports cursors

Crystal Reports uses a number of different cursors in its operation:

	The Arrow cursor is the primary cursor. You will use this cursor everywhere but where you can type text. The cursor is used for making menu selections, selecting options from dialog boxes, working with scroll bars, etc.		A Double-Arrow cursor is a resizing cursor. The cursor changes to one of a number of different double- arrow cursors whenever it is over a resizing handle on a bit-mapped graphic, a graphic box, a graphic line, or a field.
	The I-beam cursor is active whenever you are working in the text entry sections of the Design window, the Formula Editor, and some of the dialog boxes. The I-beam cursor is the cursor you use to select report elements, and to set the position of the insertion point.		The Pencil cursor is a drawing cursor. It appears whenever you select Insert/Box or Insert/Line . The point of the pencil marks the spot where the drawing begins and is used to define the size and shape of the object drawn.
	The Drag (or Stop) cursor. This cursor appears whenever the item you are dragging is over an area in which it cannot be dropped.		The single-unit Drag and Drop cursor is available whenever you are dragging a single item over an area where it can be dropped.
	The multi-unit Drag and Drop cursor is available whenever you are dragging multiple items over an area where they can be dropped.		The Tiny Hand cursor is available only in the Help facility. The Arrow cursor changes to the Tiny Hand cursor whenever it is positioned over text or a graphic that you can use to jump to another position in the Help system.
	A Section Sizing cursor. The cursor changes to the section sizing cursor whenever it is positioned over one of the lines dividing report sections. Using this cursor you can drag a section boundary line to expand or reduce the size of a section.		The Insertion Point identifies the location for entering text. This cursor is available in the text entry sections of the Design window, the Formula Editor, and some of the dialog boxes. You set the insertion point by positioning the I-beam cursor and then <i>Clicking</i> .

	The Hourglass cursor is the cursor that appears whenever Crystal Reports is processing a command you have selected. Whenever the hourglass is visible, you cannot select any other commands or proceed further with your report.		The Rectangle cursor is the cursor you will use for placing fields and formulas in the Design window. This rectangle is a graphic approximation of the field and formula markers Crystal Reports uses to represent fields and formulas in the Designer.
	The Crosshair cursor is the cursor that appears when you choose Edit/Select Fields or you click the lasso button. You use this cursor for lassoing or marquee selecting fields.		The Drill Down cursor appears when you have a summary report opened in the Preview Window. Click this cursor on the summary field that you want to drill down on.
	When you place the normal cursor on the positioning wand, it changes to the Grabbing Hand cursor. Use this cursor to move the positioning wand, and thus the field you have selected on the report page.		

Crystal Reports Design window

The Crystal Reports Design window is where you will insert and format data to create a report.

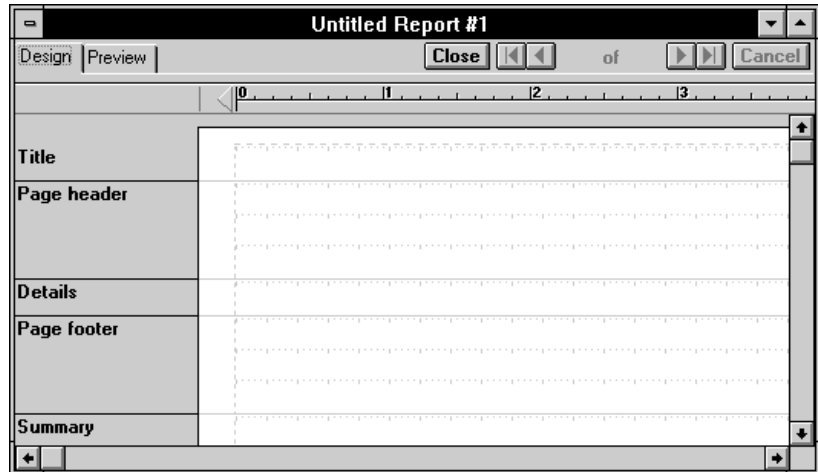


Figure 2-2. The Crystal Reports Design window

The Design window does not have its own menu. Instead, the commands from the Crystal Reports menu remain visible and are active for the Design window.

The Design window has scroll bars at the bottom and along the right hand edge. These scroll bars help you to reveal parts of the report that aren't immediately showing in the window.

The Edit box

The large white area of the Design window is the Edit box, the facility where you actually build your report. The horizontal lines in the Edit box separate the report sections. As you add additional sections to your report (as you add sub-totals, for example), the program will add additional lines to help keep you oriented.

Report section names

The gray area to the left of the Edit box gives you additional information to help you put data and objects where you want them on your report. The horizontal lines extend into the gray area further defining the sections, and the program identifies each section with a name or an abbreviation for the section name. As you add additional sections, the program identifies those as well. (Search for *Design window* in Crystal Reports Help.)

Scroll bars

You can use the scroll bars in several ways:

- You can click on one of the scroll arrows to move the document in small increments in the direction the arrow is pointing.
- You can position the pointer on a scroll arrow and hold down the left mouse button to scroll the document continuously in the direction the arrow is pointing.
- You can click on the scroll bar to scroll the window in window-height or window-width jumps.
- You can drag the button on a scroll bar to the point in the document to which you want to scroll.

Single window display

To reduce screen crowding when you have multiple open reports, Crystal Reports uses a single dynamic window for each report. When you open a report, the Design tab is visible and is selected in the upper left hand corner of the window. When you send a report to the Preview Window, the Preview tab is visible and is selected. You can click on the Design or Preview tab to toggle between the Design and the Preview Windows.

Resizable dialogs with memory

You can resize the Insert Database Field and Insert from View dialog boxes to better fit your needs. This can be especially helpful:

- When you have longer field names than fit the default dialog box, or
- When you want a longer list of fields to appear on the screen at one time.

Additionally, the program remembers the dialog box size and location and displays the dialog box as you left it when you next create a report.

Ruler

Crystal Reports makes a ruler and a positioning wand available in both the Design window and the Preview Window.

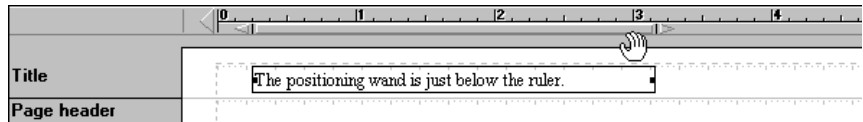


Figure 2-3. The Crystal Reports ruler

The ruler provides a visual reference for positioning and resizing fields, graphs, lines, boxes, and bitmaps. The increments on the ruler are based on your measurement settings in the International section of the Windows control panel. The ruler also enables you to change page margins while immediately seeing the results of your changes on the report itself.

- The ruler is like a number line in arithmetic; it has positive numbers above zero and negative numbers below zero.
 - The negative numbers appear only when you are using the ruler to reset the left page margin.
 - The zero (0) mark on the ruler defines the left page margin. The right end of the ruler defines the right page margin.


The positioning wand appears just beneath the ruler whenever you select one or more objects in your report.

- If you select a single object in your report, the wand duplicates the position and width of the selected object.
 - When you move the wand, the program moves the selected object to the wand's new position.
 - When you resize the wand, the program resizes the selected object to the wand's new width.
 - The Status bar at the bottom of the screen displays the right and left coordinates of the object as you modify its size and/or position.
- If you select multiple objects in your report, the bar duplicates the distance from the left edge of the leftmost object to the right edge of the rightmost object.
 - When you move the wand, the program moves the selected object(s) to the wand's new position.
 - You cannot resize fields using the wand when you have multiple objects selected.
 - The status bar does not display coordinates when you have multiple objects selected.

You can use the ruler and positioning wand in the Design window, the Preview Window, or both. To turn the ruler and positioning wand on and off, use the "Show Ruler..." switches in the Layout tab of the File Options dialog box. You access this dialog box using the **File/Options** command.

You can perform the following actions using the ruler and positioning wand:

- Change page margins
- Resize objects
- Move objects

 Search for **ruler** in Crystal Reports Help.

Snap to Grid

Crystal Reports allows you to specify how you want to use the grid. In the File Options dialog box on the Layout tab you can toggle on the checkmark in the Snap to Grid check box to activate Snap to Grid. Toggle the checkmark off to deactivate Snap to grid. By default, the option is toggled on. Select **File/Options** to open the File Options dialog box.

Using the Grid

In previous versions of Crystal Reports, a fixed size, invisible grid was present to help align your data. This version of Crystal Reports allows you to change the size of the grid, make the grid visible or invisible, and choose whether or not fields snap to the grid. Grid options are explained in the discussion of the Layout tab in the **File/Options** dialog box. You can also call up individual grid options when you click the right mouse button when your cursor is positioned on the Format bar or the Ruler. (Search for *grid* in Crystal Reports Help.)

Messages

The system displays a variety of messages to indicate error conditions or a potential problem. Each of these messages carries with it brief instructions for resolving the situation.

The messages fall into three basic categories:

- **Windows Error Messages.** These are messages from Windows itself. They indicate a problem interacting with the Windows environment. For further information on these kinds of messages, please refer to the *Microsoft Windows User's Guide* or other pertinent information.
- **Crystal Reports Error Messages.** Crystal Reports error messages indicate a problem interacting with Crystal Reports. For a complete list and discussion of Crystal Reports error messages, search for *error messages* in Crystal Reports Help.
- **Check Formula Warnings.** Crystal Reports issues Formula Compiler Errors whenever it detects a data or syntax error in a formula you are creating. These errors can be issued when you ask Crystal Reports to check a formula (prior to accepting it), or ask it to accept a defective formula.

As a guide to resolving the problem, when you select OK in the message box, Crystal Reports automatically places the cursor at the point in the formula where it detected the error.

For a complete list and discussion of Formula Compiler Errors, search for *error messages* in Crystal Reports Help.

Getting Help with Crystal Reports

Crystal Reports offers a comprehensive help system to support you during every step of the report development process.

The help system is easy to use. If you've used help systems in other Windows programs (or in Windows itself, for that matter), you probably know enough to begin using the Crystal Reports help system without further study. If you need help understanding the Windows help system, see the documentation that you received with Microsoft Windows.

The program offers two kinds of help: **context sensitive** help and **indexed** help.

Context sensitive help

Context sensitive help gives you immediate help with a screen element of interest (menu command, dialog box, etc.). The program takes you directly to the help information you seek without the need to traverse the indexing system.



To get help on a specific menu command, click the menu name and then use the DOWN ARROW key to highlight the command of interest. Once the command is highlighted, press F1.

Indexed help

Indexed help takes you to the help indexing system, a hierarchy of indexes which is designed to help you target your topic of interest. Using the indexing system, you can select a broad topic of interest from the first index and then narrow your selection using the next index that appears, then the next, etc.

Help features

The Help system is full of useful information. Here is just a sampling of things you will find there:

- Sample code for making calls to the print engine from your C, dBASE or Visual Basic application. Using the Edit capabilities built into the Windows help facility, you can cut this code and paste it as ASCII text into any editor that supports Windows cut and paste procedures. (Search for *copying sample code from help system*.)
- Full documentation of the Crystal Class Library, a C++ class library addition to the Microsoft Foundation Class Library. Use the class definition in the Crystal Class Library to access the Crystal Reports Print Engine from your C++ application. (Search for *class library help*.)
- Full documentation for the Crystal Custom Controls, a VBX and OCX you can use when working with Visual Basic. (Search for *custom control, crystal*.)
- Explanations of error messages and formula compiler errors. (Search for *error messages*.)
- Runtime information so you know which files to include when you include the Crystal Reports print engine with your application. (Search for *runtime file requirements*.)
- Tips and Tricks: dozens of helpful hints for working with Crystal Reports. (Search for *tips and tricks*.)
- Formulas for study: a series of complex formulas that showcase the use of Crystal Reports functions, operators, and formatting language in solving a number of real-world reporting problems. (Search for *formulas in action*.)
- Sample formulas: a number of topics contain sample formulas that can be cut and pasted directly into the Formula Editor to save you time. (Search for *copying, sample formulas from help system*.)

- Formula functions and operators: a complete and detailed list of all functions and operators you can use when creating formulas. (Look for the Functions and Operators topics in the Reference section of the Help System Contents.)
- Dissections of Visual Basic and dBASE sample applications included with the program. (Search for *Sample application*.)

The Help system is a storehouse of information that can make your reporting more productive and enjoyable. A comprehensive indexing system and hundreds of search terms provide you a variety of avenues for finding the help you need, right from your computer. Once you see what's in the help system, we're confident you'll return to it often.

Private Tutor - your personal instructor

Private Tutor is a personal instructor that walks you step-by-step through dozens of processes you might want to use when building a report. Unlike the Help system that gives you an answer and then returns you to the program, Private Tutor stays with you until you've finished the job. It's a special level of support that we're confident you'll use again and again.

Calling up Private Tutor



To call up Private Tutor, you can select the Private Tutor option from the Crystal Reports Help menu, click the Private Tutor icon from the main Help index, or click the Private Tutor button from any Help topic.

Private Tutor windows

The Private Tutor system uses two sets of windows:

- Step-by-step instructions always appear in a narrow window that is fixed on the right side of your screen. Because the window is narrow, you have plenty of room to work on your report while Private Tutor remains on screen. Should you ever require more room, you can either minimize Private Tutor temporarily or move the Report Window itself.
- Concepts are always explained in large windows that provide room for graphics. Private Tutor uses graphics liberally to help to clarify the theory behind many of the report-building processes.

Using help while in Private Tutor

If you want to call up the Help system while using Private Tutor, no problem. click the Help button in the Private Tutor window and the program takes you directly to the main help index. To leave the Help system, click the Private Tutor button in any Help window and the program returns you to the instructions you were using when you left Private Tutor.

About this manual

The manual is broken into six chapters:

- **Chapter 1, Getting Started.** *Getting Started* shows you how to install Crystal Reports on your system. It also includes a Quick Start section for those in a hurry to get the program up and running.
- **Chapter 2, Introduction.** *Introduction* gives you a brief overview of Crystal Reports. It familiarizes you with the Crystal Reports screens, using the mouse, error messages, and the help facility.
- **Chapter 3, Using Crystal Reports.** *Using Crystal Reports* is a chapter that leads you, conceptually, through the process of creating a report with Crystal Reports. It suggests a methodology for creating reports starting with nothing more than a one sentence statement of purpose for the report. The chapter also gives you a “feel” for the various program capabilities.
- **Chapter 4, Tutorial.** *Tutorial* is a hands-on chapter that leads you, step-by-step, through the creation of comprehensive sample reports using Crystal Reports.
- **Chapter 5, Formulas.** *Formulas* is a comprehensive presentation of formula topics. The chapter presents specific instructions for performing a variety of formula related activities, both simple and complex.
- **Chapter 6, Using Crystal Reports with SQL and ODBC.** *Using Crystal Reports with SQL and ODBC* explains the Crystal Reports tools available for working with data accessed via ODBC, and, if you have the Professional Edition of Crystal Reports, data accessed via SQL.

- **Appendix A, How to Get Technical Support.** *How to Get Technical Support* describes the various ways you can get technical support for Crystal Reports if you need it.

The manual assumes that you understand the basic concepts and usage of Microsoft DOS or PC-DOS, Windows 3.1 or higher, Windows for Workgroups, or Windows 95. If you feel that you need additional information on any of those subjects, please consult the manuals that came with the software in question.

The manual also assumes that you will be using a mouse in the creation of your reports. While the manual occasionally indicates keyboard methods for using the program, the manual is generally mouse-oriented since most Windows users have a mouse.

Special notations used in this manual

The following notations are used throughout this manual:

- **Delete** means the DEL key on your numeric keypad.
- **Escape** means the ESCAPE or ESC key on your keyboard.
- **Enter** means the ENTER, RETURN, or CR key, depending on which of these keys appears on your keyboard.
- **Click** means to click the left mouse button one time.
- **Double-click** means to click the left mouse button twice, in quick succession.
- The term **Cursor Keys** means the PG UP, PG DN, and ARROW UP, ARROW DOWN, ARROW RIGHT, ARROW LEFT, HOME, and END keys on your numeric keypad.
- **Ctrl+Key**, **Shift+Key**, and **Alt+Key** are examples of the notation for two key combinations. They mean to press the first key in the combination (CONTROL, SHIFT, or ALT), and, while keeping it depressed, to press the second key in the combination (designated as **Key**).

- Text enclosed in double brackets (for example, «***information***») is intended to expand or explain the information that it follows.
- Field names in formulas are ***italicized***.
- ***Insert/Formula*** means to select the **Insert/Formula**.
- ***Drag***, when used in talking about field boxes, means to position the cursor on a field box, depress the left mouse button, and keep the button depressed while moving the field to a new position.
- ***Drag***, when used in talking about text, means to depress the left mouse button and, while it is depressed, move the I-beam cursor across the text of interest to highlight and thus select it.
- ***Computer type*** indicates data that you are to enter text using the computer keyboard. It is also used to show example formulas.

Overview

The purpose of this chapter is to suggest a structured approach to preparing reports with Crystal Reports. The approach includes the following elements:

- Deciding on the content of your report.
- Developing a prototype on paper.
- Setting up the prototype using Crystal Reports.
- Manipulating the data with formulas and functions.
- Grouping, summarizing, and sorting your data.
- Editing and formatting the data.
- Adding graphic enhancements and OLE objects.
- Specifying the records/groups to be included in the report.
- Printing the finished report.

This is not a hands-on chapter, but an important introduction that can make your report creation more efficient and more satisfying. The chapter has been designed to provide you with a conceptual understanding of Crystal Reports as well as a brief introduction to Crystal Reports' powerful features.

Deciding on the Content of Your Report

Before you do anything else, you should outline the information you want your report to provide. Use the following list of questions as a guide:

1. What is the overall purpose of the report?
2. Who is going to read the report?
3. What is the report title going to be?
4. What information do you need besides the title to identify the report?
 - Where is that information to come from?
 - If the information exists in a database, what types of fields is the data stored in: number, text, etc.?
5. What identifying information do you want at the bottom of each page?
 - Where is that information to come from?
 - If the information exists in a database, what types of fields is the data stored in: number, text, etc.?
6. What specific data do you want to appear in the body of the report?
 - Where is that data to come from?
 - Does that data exist in data fields or does it need to be calculated from data field values?
 - What kind of fields is the data stored in: number, text, etc.?
 - Do you want to show totals?
 - What kind?
 - What do you want to total?
7. What information, if any, do you want flagged on the report? How do you want it flagged?
8. What information do you want highlighted in some way so that it really stands out?

9. Do you want the report to be based on all records in the database or only on specified records?

What is the overall purpose of the report?

Reports are management tools. Their purpose is to help individuals quickly grasp the essential elements and relationships found in raw data so they can make effective decisions. For a report to be effective, it has to present the right data in a logical way. If it presents the wrong data or if it presents the right data in a haphazard manner, the report may slow the decision making process or even encourage incorrect decisions.

A good starting place in the development of a report is to write out the purpose of the report in a sentence or two. The purpose statement helps you focus on your primary needs, and it gives your report both a starting point and a goal. Below are some examples of purpose statements:

- The purpose of this report is to show monthly and year-to-date sales by sales rep, compare this year's numbers to last year, and flag reps who are seriously deficient.
- The purpose of this report is to show sales activity for each item in inventory, and to suggest reorder quantities based on that activity.
- The purpose of this report is to calculate bowling averages and handicaps for each member of the bowling league.

Clarifying the purpose of the report before you start is a critical step in the overall process. A report without a clear purpose is like a meeting without a clear agenda; it rambles and accomplishes little.

Who is going to read the report?

A single report is often used by many individuals. A detailed, company-wide sales report, for example, may be used by sales reps, the regional sales manager, the national sales manager, and the Chief Operating Officer (COO).

Each of these individuals will be interested in different aspects of the report.

- A sales rep will use the report to evaluate his/her individual sales performance and to compare that performance to that of other reps in the region.
- The regional sales manager will use the report to evaluate the reps in his/her region and to compare the region's performance to that of other regions.
- The national sales manager will use the report to evaluate the performance of his/her regional managers and to compare overall sales to the current sales forecasts.
- The COO will use the report to evaluate the performance of the Vice President of Marketing and the sales department as a whole, and to project such things as manufacturing needs, warehouse locations, etc.

Since each of the users of the report has different interests, it is important to plan the report so it includes the information each of the users is looking for.

What is the report title going to be?

Write out a working title for your report. You may decide to change it later, but at least you will have a title to use when creating your prototype report.

Header information

What information do you need besides the title to identify the report? Are you going to include identifying information in addition to your report title? You may wish to include the current date, information on who prepared the report, a block of text to describe the purpose of the report, the range of data covered, etc. If you are going to include such information, write it down so you can use it in preparing your prototype.

Header information sources

Where is that information to come from? The information can come from a variety of sources, depending on the kind of information you plan to use. For example, the current date can be inserted using the Crystal Reports **Insert/Special Field/Print Date Field** command. Information on who prepared the report might be drawn from individual data fields in the database(s) used. (If it is to be drawn from a database, what database? Or, what combination of databases?) A block of text can be created and entered on the face of the report itself. As you begin to think of where the information is to come from, you begin formally structuring the report.

Data types in the header

If the information exists in a database, what types of fields contain the data: number, text, etc.? Crystal Reports uses different rules for working with different types of data. You will find it helpful later if you note the data type of each piece of data you plan to draw from a database.

Footer information

What identifying information do you want to appear at the bottom of each page (page number, report name, author's name, Confidential, etc.)?

Footer data sources

Where is that information to come from?

Data types in the footer

If the information exists in a database, what types of fields is the data stored in: number, text, etc.?

Report body data

What specific data do you want to appear in the body of the report?

When you think of a report, it is probably the body of the report that you think of. The body should contain all the data that you need to fulfill the statement of purpose you wrote for the report. It should also contain all of the data needed by the various users that you have identified. You might find it helpful to list first the basic data that is required to fulfill the purpose statement, and then list the more specific kinds of data needed by the various users.

Body data sources

Where is that data to come from? This step requires you to look at the available databases. Crystal Reports allows you to combine data from different data-bases to create your reports, so you have a great deal of flexibility in your work.

- Much of the data in a typical report will be taken directly from data fields. Which data fields will you be using and where are they located?
- Other data will be calculated based on data fields. Which data fields will be used in the calculations?
- Still other data will be input directly into the report (headings, text blocks, etc.). Which data will you enter directly on the report, without drawing it from data fields?

Existing or calculated?

Does that data exist in data fields or does it need to be calculated from data field values?

Some report information can be drawn directly from data fields (sales information, for example); other information will have to be calculated based on data field values (sales commission, for example, based on the relationship of sales to quota). In your planning, it can be helpful to segregate or flag data that needs to be calculated from that which can be used directly.

Data types in the body

What kinds of fields contain the data: number, text, etc.? While it is important to understand data types for all data you will be using, it is of critical importance that you know the data type for data fields that will be used in calculations. Functions and operators work with specific kinds of data, so it's important to know the data type to know which functions and operators you can use in your calculations.

Groups

Do you want your data organized into groups? How do you want it grouped? By customer? By date? Or by other criteria?

Group values

Do you want to show a subtotal at the end of each group? A count? An average? Crystal Reports allows you to specify several kinds of group values.

Group value positions

Where do you want the group values to appear. With the group data? With the group data but on a page separate from other groups? Only at the bottom of the page? Crystal Reports gives you all of these options.

Grand totals, grand total averages, etc.

Do you want to total (or average, count, or determine the maximum or minimum value included in) all the values in any column on your report? Crystal Reports allows you to do this and place the grand total (or the grand total average, grand total count, etc.) at the bottom of the selected column.

Flags

What information, if any, do you want flagged on the report? You may want to call attention to some data by flagging it on your report. For example, non-moving inventory items are often flagged on inventory reports so they can be given special attention.

If you want any information flagged, identify the information and the parameters for flagging. Using the inventory report example, you might want to flag each item that has shown no activity during the last month, during the last three months, or during some defined period.

Flag options

How do you want it flagged? You may want to flag items with an asterisk or some other symbol, or you may want a word to appear as a flag. In any case, you should write out flagging instructions so they are handy.

Highlights

What information do you want highlighted in some way so that it really stands out? Crystal Reports gives you the opportunity to underline report elements, or to change the fonts or font size or color used for specific report items. It allows you to put borders around items and to draw lines and boxes to break your report into sections, set off headings, etc. All of these formatting tools can be used to highlight key data on a report. If you have data that you want highlighted, you should write down highlighting instructions so they are handy too. Record or group selection

Do you want the report to be based on all records or groups in the database or only on specified records or groups? Crystal Reports gives you the opportunity to base a report on all records in a given database, or on a limited set of records from the database. Using Crystal Reports you can select records based on simple date ranges or comparisons, or you can create complex formulas to identify the records to be included. Take a few minutes to determine the records needed for your report and list the criteria to be used for selecting those records.

Sorting

Do you want your data sorted based on record or group values? Crystal Reports gives you both alternatives.

Developing a Prototype on Paper

Graphic designers generally begin their work on a magazine cover, brochure, or display advertisement with a rough pencil sketch. They often use boxes, circles, or other symbols to represent the graphic elements they intend to include in the final product, and they often use lines or scribbles to represent text. Doing the rough design on paper, in pencil, helps them create a look for each page. It helps them find a balanced way of positioning the various elements before they begin working with sophisticated graphics tools. We think you will find a similar exercise helpful in designing your Crystal Reports reports.

While a paper prototype is useful regardless of your expertise with Crystal Reports, it is particularly valuable when you are first learning to use the Crystal Reports program. With the paper prototype at hand, you can put your full effort into learning and using the Crystal Reports commands instead of trying to design and learn at the same time.

To design a paper prototype with Crystal Reports:

- Get paper of the size you'll be using for your finished report.
- Position your title and other descriptive header information, using boxes or lines to represent report elements.
- Position your footer information.
- Review the page for balance.
- Look at the information you intend to include in the body of your report.
 - Count the number of fields you will be using and estimate the appropriate spacing between fields.
 - Use rectangles to pencil in the fields using your estimated spacing.
 - Change the spacing if you need to.
 - Decide on a logical sequence for presenting the data of the report.
 - Label the fields to indicate that sequence.
- Use small boxes to indicate group values and totals.
- Place random flags in the column where you want the flags to appear.
- Darken any elements you want highlighted so they stand out from the rest of your prototype.
- Review your finished product for look and balance, and make changes as needed.

Setting up the Prototype Using Crystal Reports

Once you have completed your paper prototype, it is a straightforward process to recreate that prototype in the computer, using Crystal Reports. Before you do, it is important to understand how Crystal Reports' report editing process works.

This section assumes that you are new to Crystal Reports and that you plan to build a simple report using data from a single database. No advanced topics are covered in this section.

When you click on the Tables icon to create a new report from the Report Gallery or one of the Report Experts, Crystal Reports displays the Choose Database File dialog box.

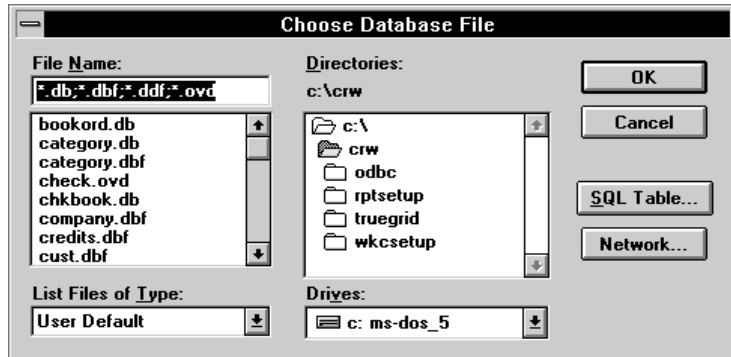


Figure 3-1. Choose Database File dialog

You use this dialog box to select the database file(s) that contain the data you want to use in your report. You will first select the directory and, once in the directory, you can select the database file you identified earlier in *Deciding on the content of your report*.

Crystal Reports also lets you build reports from Data Dictionaries and Report Templates. Both of those subjects are covered immediately after the next section (Aliases).

Aliases

For a variety of reasons, database names and locations get changed. Many times this is not a problem, but if you have created a report using fields in formulas, changing the name or location of the database after you have created the formulas could be a real problem. Crystal Reports would look for formula fields under the old database name, and if the database had its name changed, the program wouldn't find the fields and thus couldn't use the formulas.

Crystal Reports avoids this kind of problem by using aliases. Aliases are pointers, programming devices that tell Crystal Reports where it should currently look for a database field. Now, if you change the name or location of the database (via the **Database/File Location** command, page you simply reset the pointer (tell the alias about the change). The name of the alias doesn't change, so your formulas are not affected. Crystal Reports looks to the alias for a location as always, goes to the new location for the field, and runs the formula without a problem.

You accept the default alias or create a new one whenever you activate a new database for your report. You reset the alias pointers whenever you change the name or location of the database. Crystal Reports uses the database file name (without the extension) as a default alias. Thus, the database *customer.dbf* would generate the default alias *customer*. (For more in-depth discussions of aliases, search for *alias* in Crystal Reports Help.)

Crystal Reports uses the following syntax for fields used in formulas:

```
{file.fieldname}
```

We will use the same syntax throughout this manual when identifying fields in formulas.

Experts

You can use Crystal Reports Experts to help you create reports as quickly as possible. When you select the New Report button (or **File/New/Report**), the Report Gallery appears. In the Report Gallery you will find a series of icons representing the different types of experts that are at your disposal.

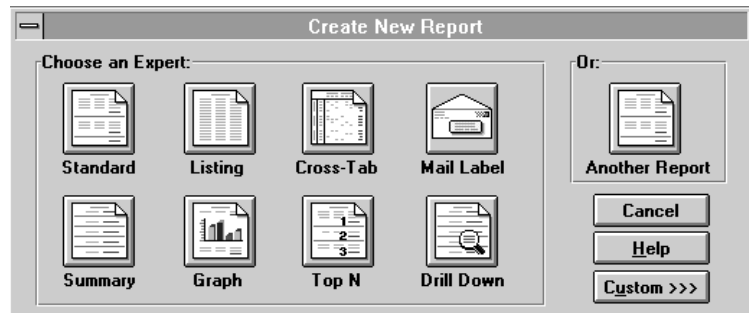


Figure 3-2. The Report Gallery and Expert icons

Just click on the icon for the type of report you want to create. When the appropriate Expert dialog box appears, follow the steps outlined in the dialog box tabs.

If you want to simply build a new report based upon one that already exists, click the Another Report icon. The program will make a duplicate of the original report, which you can modify however you please to create your new report.

If you want to build a report from scratch, click the Custom button in the Report Gallery. Several Report Type and Data source icons will appear at the bottom of the Report Gallery; click the icons that are appropriate to your needs.

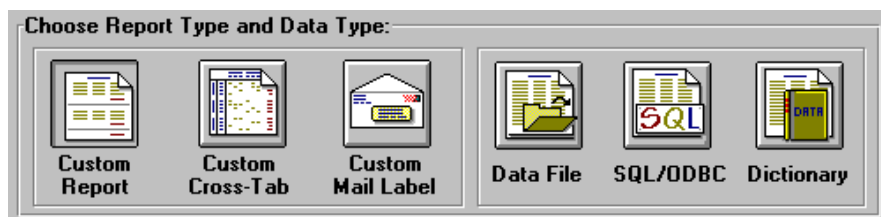


Figure 3-3. Report type and Data Source icons

The program will take you to a dialog box allowing you to select the data you need. Since building reports from scratch is the easiest way to learn about all the powerful features of Crystal Reports, this is the method we will discuss in the manual.

Data Dictionaries

Instead of directly selecting a database for building a report, you may be able to select a Data Dictionary if your company uses Dictionaries. A Data Dictionary is a one-stop, ready-to-use source of data that can be created using the Professional Edition of Crystal Reports.

Data Dictionaries let you concentrate on the things that are important to you. They let you get out the reports you need in a hurry without your having to wade through extraneous information or deal with the complexities of locating and linking tables.

There is nothing technical about using a Data Dictionary. The Dictionary Builder in your organization (usually the IS department or some other computer professional) does all the technical work for you. The builder:

- Gathers together tables, links, formulas, graphics, and/or report templates,
- Selects the data that is important to you, and
- Organizes (and renames it, if necessary) to make it easy to understand and to use.

You get a Dictionary that contains only that data that's important to your specific needs.

With a Dictionary, instead of searching multiple databases, struggling with links, building formulas from scratch, locating graphics, and decoding cryptic field names, you simply:

- Select the pieces that you want, and
- Build your report.

It couldn't be easier.

Once you've selected your Data Dictionary, you select items for your report from the Insert From View dialog box.

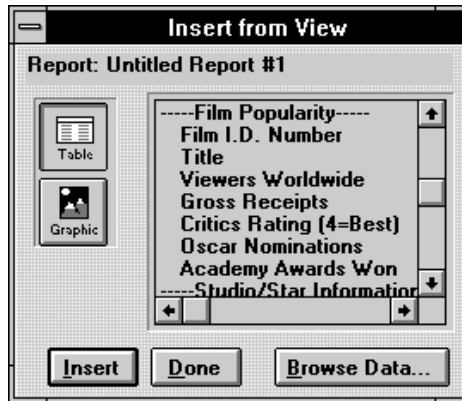


Figure 3-4. Insert From View dialog

For more information on this dialog box, search for Insert from View in Crystal Reports. If you have the Professional Edition of Crystal Reports and want to learn more about creating Data Dictionaries, search for *Data Dictionaries* in Crystal Reports Pro Help.

Report templates

Instead of starting from scratch when building a report, you might find it easier to begin with a template from a similar report that you created earlier.

A template is a copy of a report. It contains all of the data, links, formulas, and graphics that your original has, but it isn't tied to your original report in any way. It's a separate entity. When you modify a template, your original report remains unchanged.

Templates boost your efficiency. Use them whenever you think they can save you time. Here are some of the times templates will be useful:

- When you need to create a new report with a different grouping or different record selection than an existing report,
- When you need to create a series of reports, each a little different than the last,

- When you need to reconstruct a report based on an earlier time period using the same report structure you use today, and/or
- When you need to create an entirely new report based on a set of databases that are linked in another report. You can create a template and delete the fields from the Design window without disturbing the underlying links. Then, without relinking, you can build your new report in a hurry.

You'll probably find many other times that report templates will be useful.

When you decide to build a new report based on a report template, you click on the Another Report icon in the Report Gallery. When the File Open dialog box appears, select the report of interest from that dialog box (search for *File Open dialog box* in Crystal Reports Help). The program opens the Design window with the template already in place. You don't need to select databases unless you want to add to those already activated. All you need to do is add, delete, and rearrange report elements until your new report is the way you want it. For more information on creating a report from a report template, search for *Report Templates* in Crystal Reports Help.

The Design window

Once you select your database, Crystal Reports displays the Design window. You use this screen to insert and format data.

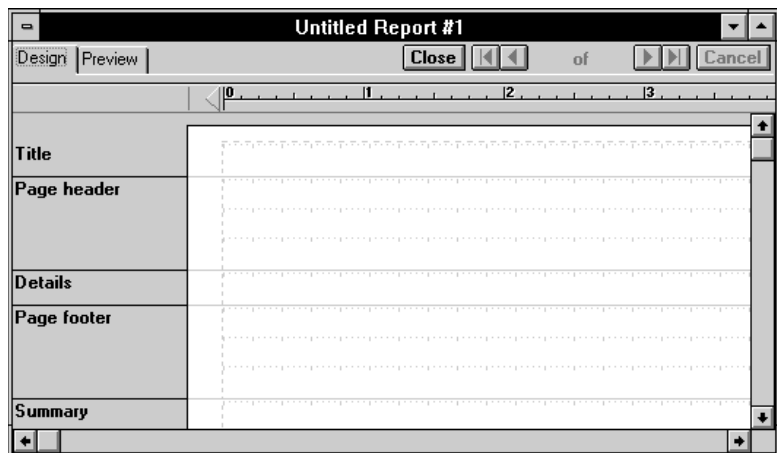


Figure 3-5. The Design window

When you open a new report, Crystal Reports automatically creates five sections in the Design window:

- **A Title section** - this section is generally used for the report title, and other information you want to appear at the top of the first page.
- **A Page header section** - this section is generally used for field headings and other information that you want to appear at the top of each page.
- **A Details section** - this section is the body of the report. The bulk of your report data will generally appear in this section.
- **A Page footer section** - this section usually contains the page number and any other information that you want to appear on the bottom of each page.
- **A Summary section** - this section allows you to include a summary at the bottom of your report. You can choose to print the summary on only the first page, or on all pages.

Each section is separated by a section marker which displays the section name.

- You build your report by inserting data fields, formulas, and other report elements (record counts, record numbers, etc.) in the Details section of the Designer. You use the Insert menu, in most cases, to select or create the elements you want to insert on the report. The Design window uses rectangular element markers to indicate the size, position, and data type of the report elements you have inserted.
- You add subtotals (and other group values) by selecting a field to subtotal and then telling Crystal Reports the conditions that are to generate a new subtotal or group value (change of customer number, change of sales rep, etc.) Crystal Reports creates group value sections as needed and places the group value in the section. Again, Crystal Reports uses rectangular field boxes to represent the group values.
- You insert grand totals in the Grand Total section. This section appears when you select the field to total and then select **Insert/Grand Total**. Crystal Reports uses a rectangular field box, this time to identify the field in the Grand Total section of the Design window. (Search for *Insert Grand Total* in Crystal Reports Help).

- You can add freeform text anywhere on the report by positioning the text cursor in the section in which you want the text to appear, typing in the text, and then using the TAB key to move it into position. You can also type freeform text in a text field; this allows you to avail yourself of additional formatting options (alignment, hide options, etc.).


Auto-scrolling capabilities

The Design window has auto-scrolling capabilities. That is, whenever the cursor hits one of the edges of the Design window when you are placing, resizing, or moving a field or drawing a graphic line or box, the Designer automatically scrolls to reveal more workspace (if more is available).

Resizing sections

The Design window first appears with default section sizes. You can expand or reduce report sections in one of three ways.

- Dragging the lines that separate the sections. When you position the I-beam cursor over one of those lines, the cursor changes to a double-arrow resizing cursor. Once that cursor appears, you can resize as needed.

 *If you have fields in the section you want to resize, the program keeps the section large enough to hold the fields. For example, if you have three lines in a section with a field on each line, the program won't let you drag-resize the section smaller than three lines.*

- Pressing the ENTER/BACKSPACE key. The ENTER key adds a line below the insertion point and the BACKSPACE key deletes the current line as long as the line is empty. If the line isn't empty, it moves the insertion point to the line above it. click the I-beam cursor to set the insertion point and use ENTER or BACKSPACE as needed.
- Using the Right mouse-button menu. To do this, place the cursor over the gray area at the left of the Design window or Preview window that corresponds to the section you want to resize. Then click the right mouse-button and click Add Line to add a blank line to the bottom of the section. Click Delete Last Line to delete the bottom line in the section (provided the line is empty).

A word about databases, records and fields

Before we go any further, a discussion of databases, records, and fields is in order.

A record is the basic building block of a database. Each record contains data about a single entity (a customer, an order, etc.), and each database contains at least one record. The data in each record is stored in fields (holding spaces). Each field holds one piece of data known as a value. The database from which you will create a report is a collection of related records. A customer database, for example, is a collection of records that each contain data on a single customer.

Records and fields in row/column reports

Think of the data in a database as being stored in horizontal rows and vertical columns.

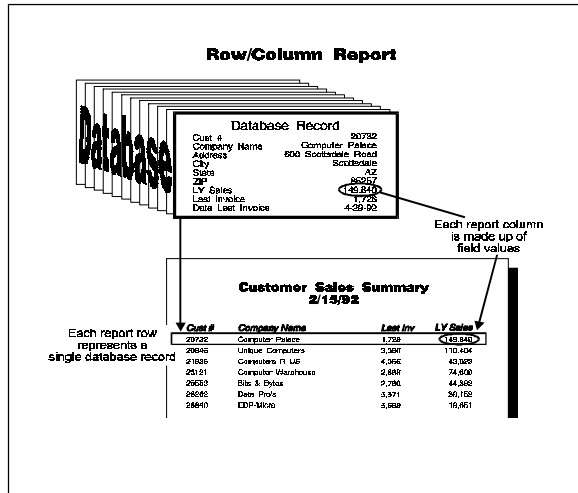
CustNumber	Fname	Lname
01034456	Bill	Brown
01034457	Jane	Doe
01034458	Bob	Jackson
01034459	Mary	Jones

The table above shows field values for four records from such a database (in this case a customer database).

- Each row represents one record. All of the data in that row is about a single customer, but the data is broken into three distinct pieces: customer number, first name, and last name. Each of those pieces represents a value found in a field on that record, the CustNumber, Fname, and Lname fields respectively (as indicated by the column headings).
- Each column represents one field. All the data in a given column represents the values that appear in that field on each of the records in the database.

The structure of a row/column report corresponds to the structure of a database with rows representing individual records and columns representing individual fields.

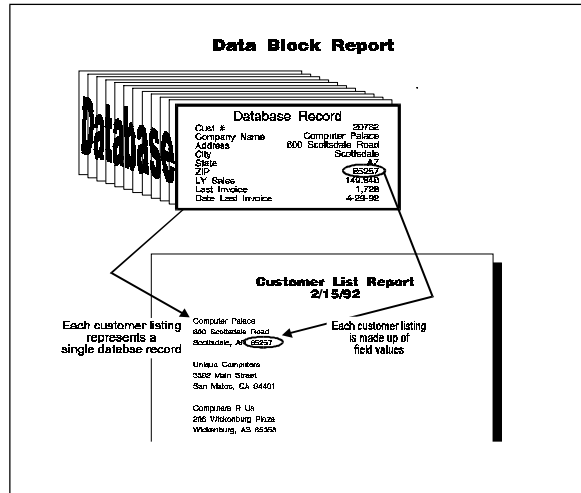
Data being used in a row/column report. Each row is a record and each column is made up of values from one field from multiple records.



Records and fields in data block reports

Some reports don't follow the row/column format, however. Some group related data in data blocks. A mailing list, for example, typically uses several rows for each record: a row for the company name, a second row for the street address, a third row for the city, state and ZIP code, etc. In such a report all the data for a given customer in the list appears in a block. Each block represents a single record even though the data in the block spans several rows.

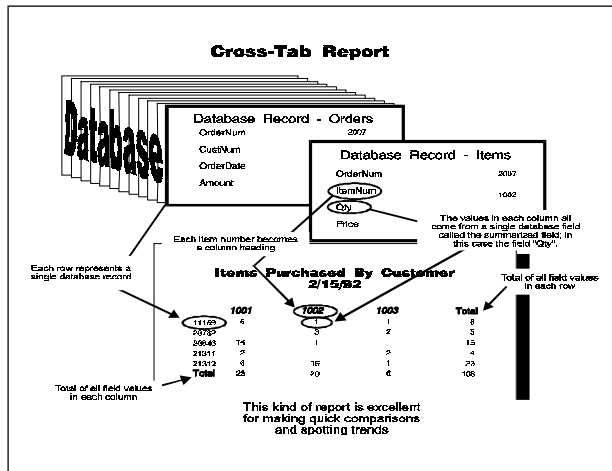
Data being used in a data block report. Each customer entry is a record consisting of several fields.



Records and fields in cross-tab reports

Cross-tab reports follow the row/column format but with a different twist. In a cross-tab report, the values from a single field are distributed among a number of columns with a value from that field appearing at applicable row/column intersections. For example, a report might have one customer for each row in the report and one part for each column. In such a report, the summarized field value (typically the quantity ordered or the dollar value ordered) appears at those row/column intersections that define customer purchases. Thus, in one compact report, an individual can rapidly compare customers and their ordering habits for specified parts.

Data being used in a cross-tab report. The report shows values from a single field (the summarized field) at row/column intersections. This makes it easy to make comparisons and spot trends.



In this spreadsheet-like report:

- Each report row represents a single database record,
- Each column represents some of the values from a single database field,
- The total at the bottom of each column represents the total of all the field values in the column,
- The total at the end of each row represents the total of all the field values in the row, and
- The total at the lower right-hand corner of the report represents the total of all the field values in the entire report.

Data types

The data type of a field, (string, number, currency, date, Boolean, or memo) determines the type of information that can be stored in that field and which will print in the report column.


Fields of each data type display on your screen like this:

xxxxxxx	String - for example, a company name, account description or customer name.
\$5,555,555.55	Currency (Paradox/Btrieve files only) - for example \$500.00 or \$50,000,000.00.
5,555,555.55	Number - for example 120 or 5555.
DATE/TIME	Date - for example Oct 10 90.
YES/NO	Boolean (YES/NO) data fields - for example, the result of a formula which compares a customer's credit limit to see if it is greater than \$5000 and prints YES if the credit limit is more than that amount; NO if it is less than that amount.
xxxxxxx	Memo a paragraph describing a piece of property, comments regarding a job applicant, a summary of a movie plot, etc.

Formatting, and record and group selection

While formatting, and record and group selection will be covered in depth later, there are a few things about those subjects that are worthwhile to cover here:

- Currency, date, and Boolean fields are shown above in the default format. This format is used for both the element markers (in the Design window) and for the report elements themselves (in the report). If you want your data to appear in a different format on your report, you can make the desired changes using the **Format/Field** command. (Search for *Format Field command* in Crystal Reports Help).

 *The characters in the element markers change to reflect font changes and many formatting changes (alignment, etc.).*

- The width and position of a field (when you place it in the Design window) determines the initial spacing between fields and the order in which the fields will print across the report page.

- When you insert a data field in your report, Crystal Reports assumes that you want to pull data from all the data records in the selected database. To limit the records (or groups of records) used in your report, you need to tell Crystal Reports how to identify the records or groups of records you want to include. Using Edit Record Selection Formula or Edit Group Selection Formula on the Print menu, you can build the selection formula that fits your needs. (For more information, search for *Edit Record Selection Formula* and *Edit Group Selection Formula* in Crystal Reports Help.)

The Preview window

When you want to preview your report before printing, use the program's Print Preview option. When you select this option, the program gathers the data, makes the necessary calculations, and displays the report in the Preview window on electronic "paper." With the data in place, you can review the spacing and formatting of your report and see the actual results of all your summaries, formula calculations, and record and group selections.

Fine tuning your data

In true WYSIWYG fashion, you can also work directly on this live data, fine tuning it until the report has the exact look and feel you want. You can:

- Change fonts
- Move and resize columns
- Refine selection formulas
- Add subtotals, sorts and grouping conditions
- Select multiple fields using the SHIFT-CLICK combination or the lasso
- Move fields from one report section to another
- Hide sections that you don't want to print
- Format individual field types
- Change the active printer
- And more, all without leaving the Preview window.

The Crystal Reports menus (both menu bar and pop-up), the Button bar, and the Format bar remain active, giving you essentially the same functionality you have when working with a template in the Design window. The Design window and the Preview window are tied together internally. Any changes you make in one are reflected in the other.

A different look and feel

Working in the Preview window has a different look and feel than working in the Design window.

Each field in a database contains dozens, hundreds, or even thousands of values, depending on the number of records in the database. When you place a field in the Design window, a single field box represents all those values. When you select the field, sizing handles appear on the box and the box changes color.

In the Preview window, however, you are working with actual data. Instead of a field box representing many field values, the values themselves appear. When you select a field, a sizing box appears around every value from the field selected. Likewise, when you select a summary field, a sizing box appears around every related summary value. While the look and feel is different, the process of building and modifying a report is the same in both the Design window and the Preview window. You should find it easy to work with your reports in both places.

No need to rerun the report

When you print your report to the Preview window, the program retrieves the required data from the specified database(s). Depending on the size of your database(s) and the complexity of your report, this retrieval process can take anywhere from a few moments to an hour or more. If the retrieval process takes a long time, you clearly don't want to repeat it more often than necessary. The fine tuning capability in the Preview window was designed with this in mind. Here's how it works.

Let's assume that you create a report that includes fields A, B, and C. When you call up the Preview window, the program retrieves the data in fields A, B, and C from the active database(s) and holds it temporarily with the report. As long as you're working with the retrieved data, you can manipulate it in any number of ways and the program will never have to go back to the database.

If you want to add additional data once you're in the Preview window, however, you force the program to run the report once again. It has to go back and retrieve the original data as well as your new requirements.

Procedures that force the program to rerun the report include:

- Adding databases, tables, links, or fields that weren't in the original report,
- Adding formula fields referencing fields that weren't in the original report, and
- Revising record selection criteria to include records not already included in your report.

With some simple planning you can avoid these revisions and the extra processing time they entail.

1. Build your original report with all of the records, fields, and formulas that you think you might possibly need. This causes the program to retrieve all of the necessary data the first time it runs the report. (If you don't include everything in your final report, you've lost nothing.)
2. Rework the report in the Preview window until you get it the way you want it. Since you brought in all the data the first time, there's no need for the program to go back and get it again.

You can force the program to go back and get fresh data any time you want by using the **Report/Refresh Report Data** command or by Clicking the Refresh (lightening bolt) button in the Preview window.

Don't get carried away and try to include every possible database, field, and link. At some point your initial processing time penalty can outweigh any potential time savings you are seeking.

Drill down

Crystal Reports allows you to *drill down* to find the details behind summarized data. Follow the procedure below to drill down on a summary report.

- | Step | Action |
|------|---|
| 1. | Open your report. The report must contain at least one summary field. |
| 2. | In the Design window, make sure the Details section is hidden. |

3. Print the report to the Preview window.

Response: A summary report will appear showing summarized values for each group and a single Report tab appears at the top of the window. Since the details are hidden, a drill-down cursor replaces the normal arrow cursor. You use this new cursor for drilling down to get the details behind any group summary.

4. To drill down on a particular group, double-click any of the fields in the group of interest using the drill down cursor.

Response: The program displays the details behind the group summary (a group details report) and it creates a new tab at the top of the window for the group you're working with.

5. To drill down on another group, click the Report tab to return to the Summary report and repeat Step 4 for the new group.

Each time you drill down on a group, the program creates a new tab for that group. You can move to any detail report or return to the summary report simply by Clicking the tab for the report of interest.

If the program creates too many tabs to fit in the Preview window, it activates the two scroll buttons in the top right-hand corner of the window. You can use these buttons to scroll through the tabs to find the report that you want.

When you close the summary report, you close all the detail reports as well.

The Record Counter

When you're working in the Preview window, the Record Counter changes to let you know that you're working with existing data.

When Crystal Reports displays a report in the Preview window, it sets the first column in the Record Counter to n of N , indicating


- The number of records n that have been selected out of
- The number of records N that have been read.

Saving your data with the report

The program gives you the option of saving only the report definition or saving your data with the report as well.

- If you save only the definition:
 - Your report will require less disk space (enough for the definition only), however,
 - You will need to rerun the report before you print it.
- If you save your data with the report:
 - Your report will require slightly more disk space (enough for the report definition and the compressed data), however,
 - You won't need to rerun the report before you print it.

If the report can run quickly, saving the data with the report may not be important to you. But if your report takes time to run, you may find the Save Data with Closed Report option a real convenience.

 *Saving data with your report is also a good idea if you want to save the data for reference later. For example, if you run a report on a weekly basis, you might want to save the data with the report each week. With the data saved, you can make historical comparisons easily, working with the actual data that existed at the time each report was created.*

When you open a report that you have saved with the data, the report template appears in the Design window followed by the Preview window displaying actual report data. The Date and Time displayed in the Preview window identifies the data used in the report.

Building your prototype

Your main steps to build a report are:

1. Select the database(s) you wish to use in your prototype report.
2. Enter and position the data fields, text, and titles you want included in the title, header, footer, body, and summary of your report.

3. Print your report to the Preview window and review your work.
4. Make whatever changes are called for.
5. Insert your totals, subtotals and other group fields.
6. Enter and position any formula fields that will calculate or manipulate data or create flags.
7. Print your report to the Preview window and review your work.
8. Format the report elements that you want to stand out in some way from the others.

Selecting the database(s)

Use the **File/New Report** command to begin creating your report. When the Report Gallery appears, click Custom to build a custom report. When you click Custom, the Report Gallery expands, and you then select a Report Type and Data Source for your custom report (database, Data Dictionary, etc.) and the category of report you want to create (columnar report, cross tab report, etc.) Your selection here leads you to a dialog box from which you can select the first data source you wish to use. (For more detailed information, search for *Selecting a database* in Crystal Reports Help.)

- If you select a Data Dictionary as your data source, you select a view and then build your report using the report elements included in that view.
- If you select a database as your data source and you want to activate additional databases as well, you use the **Database/Add Database to Report** command (search for *Add Database to Report* in Crystal Reports Help).

Visual linking

Use Visual Linking to link two or more databases together. When you select **Database/Add Database to Report** from the menu, and select a second database, you identify the linking fields in one database and drag it to the companion fields in the other to complete the link. (Search for *Linking Databases* in Crystal Reports Help).

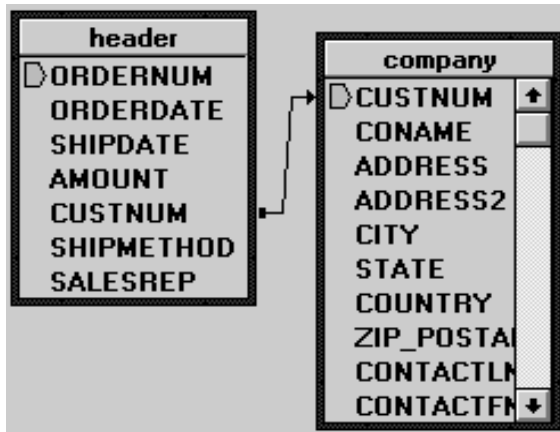



Figure 3-6. Sample Visual link

Entering and positioning data fields

You enter and position data fields using the **Insert/Database Field** command (search for *Insert Database Field* in Crystal Reports Help). This command takes you to a dialog box that lists available fields in the selected database.

 *When you create a new report and select your first database, the program automatically displays the Insert Database Field dialog box, ready for you to use for selecting fields. When you select a Data Dictionary as your data source, the program displays the View Insert dialog box from which you can pick the various elements you want to appear on your report.*

You make your selections from the list, and then you:

- Drag and drop each field onto your report, or
- click Insert (or double-click the field) and place it using a rectangular placement cursor.

You can also select multiple fields from the list and drag and drop them on the report at one time. When you do, the fields will appear in the report side-by-side in the same order they appeared in the dialog box.

Making changes

You move a database field in one of three ways:

- Dragging it to a new position with the mouse,
- Selecting it and using the arrow keys, or
- By selecting the field and moving the bar on the ruler that corresponds to the selected field.

You can move a field within its originating section or to other sections of your report if you wish. (Search for *moving fields* in Crystal Reports Help). You delete a field by selecting it and then pressing the DELETE key.

Notes

To select multiple fields at one time, press the SHIFT key and, while keeping it depressed, click the various fields you want to select. Handles will appear on each field selected. When finished, you can move or delete the selected fields as a group, change the font, field formatting, etc.

You can also select multiple fields, or individual fields for that matter, by surrounding the fields in the selection 'lasso.' You activate this lasso via the **Edit/Select Fields** command or by clicking the lasso button on the button bar. (For further information on the selection lasso, search for *Select Fields* in Crystal Reports Help.)

Still another way to move objects is by using the positioning wand in Crystal Reports.

Follow the procedure below to move an object using the positioning wand.

Step

Action

1. Click on the object(s) you would like to move.

Response: A wand with arrows on either side appears directly below the ruler.

2. Move the cursor directly over the wand until it becomes a Grabbing Hand cursor.

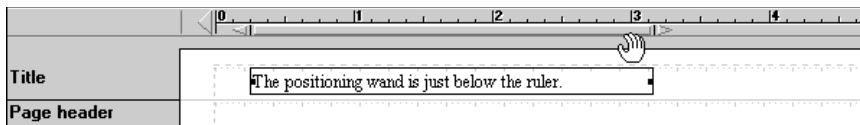


Figure 3-7. The Grab Hand cursor

3. Drag the positioning wand to the desired position. Use the increment marks on the ruler and/or the Status bar coordinates at the bottom of the screen as guides for making the exact placement.

Adding text

You can add text to your report by typing it at the text cursor and then moving it into place. You move the I-beam cursor to the line on which you wish to enter text and click the left mouse button to set the text cursor at the left edge of the Design window. Then you simply type in your text, move the I-beam cursor in front of it, and push it into position using the TAB key or SPACE BAR. You can also add text by inserting text fields and positioning them as you would any other field (see *Inserting Text* in Private Tutor).

Entering field titles

By default, Crystal Reports automatically inserts a field title whenever you insert a new field or formula field. The title is a text field that can be edited. The left edge of the title field is aligned with the left edge of the field it identifies. To turn this feature off, select the Layout tab in **File/Options** and toggle the Show Field Names checkbox off.

Entering a chart/graph

Crystal Reports offers you several formats and options for adding charts to your reports. You can select the Type of chart, the Layout of the chart, the Text to be used in the chart and Options for the chart. The charting feature and charting options are available from both the Design window, and the Preview window.

To insert a Chart/Graph, select **Insert|Graph/Chart**, or click on the Graph/Chart button on the button bar. The Graph/Chart Expert dialog box appears with the Type tab selected.

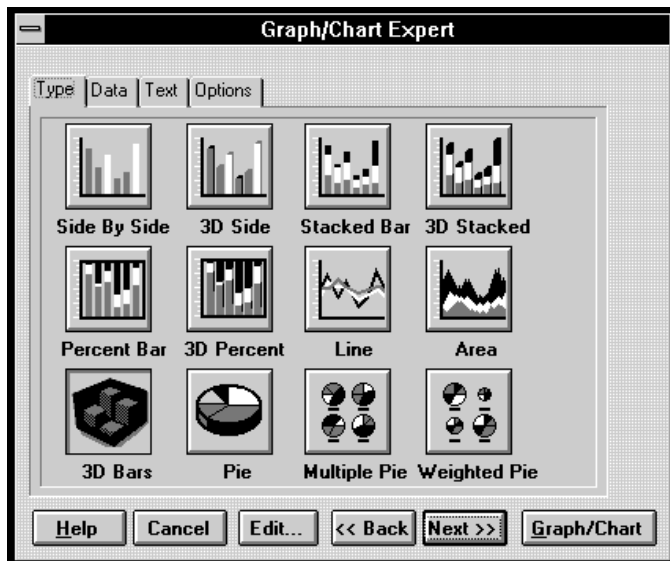



Figure 3-8. The Graph/Chart Expert dialog

 For the Chart feature to be available, you must have a report open in either the Design window, or the Preview window, and a summary field in the report. If there is no report open, Crystal Reports will not insert a chart when you select the chart feature.

Click on the Type of chart that will illustrate your data best. Click OK and Crystal Reports inserts the chart in your report and returns you to the report with the chart selected and resizing handles visible. You can now move the chart anywhere in your report, and resize the chart if necessary. (For more information about graphs and charts, search for *Graph Command* in Crystal Reports Help.)

Placing totals, subtotals, and other group values

You place grand totals by selecting the numeric or dollar field you want to total, and then selecting **Insert/Grand Total** (search for *Insert Grand Total* in Crystal Reports Help).

You select group values (subtotals, group averages, group counts, etc.) by first selecting the field you want grouped. Then you select the kind of group value you want, using the **Insert/Subtotal** or **Insert/Summary** commands (search for *Insert Subtotal* or *Insert Summary* in Crystal Reports Help). You select the kind of group value you want (if you selected **Insert/Summary**). Then you select the field that the program uses to sort and group your data by and the sort direction.

Moving group values

You move a subtotal or summary by dragging it to a new position with the mouse, or by selecting it and moving it with the arrow keys, or by selecting it and moving the bar on the ruler that corresponds to the selected field. You can move subtotals and summaries only within their originating sections, or from the group footer section to the group header section for the subtotal or summary of interest.

Arranging data automatically

When you place a field on your report, Crystal Reports allocates a space equal to the field width as specified in your database. Often that field width is far larger than the values that actually appear in each of the fields. For neat looking reports, it is often necessary to resize the fields so the space allotted more closely matches the size of the field values. Once you've resized the fields you often need to reposition them for proper balance.

To save you time, Crystal Reports 4.5 includes an "Auto Arrange" capability that:

- Adjusts the spacing between fields,
- Repositions the fields, and then
- Centers your report on the page, automatically.

Follow the procedure below to use this capability.

Step	Action
1.	Create your report as you normally would. <ul style="list-style-type: none">■ Select and position report fields.■ Build and place report formulas.■ Group and summarize the data the way you want it.
2.	Click the Auto Arrange button, located at the bottom of the Design or Preview window.

Entering formulas

You enter formulas using the **Insert/Formula** command (search for *Insert Formula* in Crystal Reports Help) That command calls up the Formula Editor. Using the Formula Editor, you build your formula using fields, functions, and operators, and check your work using the built in formula checker.

Formatting

You can change the font or point size using the **Format/Font** command. You can change the alignment and printing characteristics of field data using the **Format/Field** command, and you can change the conditions that trigger subtotals, add page breaks, suppress blank lines, hide selected sections, etc. using the **Format/Section** command. (For more information on these commands, search for *Format Font*, *Format Field*, and *Format Section* in Crystal Reports Help).

Once you have built a prototype report, you have a working model that you can customize to meet your specific needs.

Manipulating Data with Formulas and Functions

Crystal Reports uses formulas and functions to help you create reports more quickly and easily. It uses them also to allow you to do the kind of “number crunching” and data manipulations that are necessary for advanced reporting.

Formulas

A formula is a set of instructions that may be used to calculate information you can't obtain directly from database data fields. For example:

- A database record may have a **Qty1** field and a **Qty2** field but no field that sums both quantities. If you want the sum of these two fields to appear on your report, you need a formula that adds the value in one field to the value in the other.
- A database record for a sales rep may contain the field **GrossSales** and you want to use 120% of that gross as the sales quota for the following year. To accomplish this you need a formula that multiplies **GrossSales by 120%**.
- A database record for a one product company may contain a field **Revenue** that expresses total dollar sales for the year. You're interested in determining the number of units sold based on an average price of **\$49.95** per unit. To accomplish this you need a formula that divides **Revenue by \$49.95**.

All of these examples require simple formulas: **{file.Qty1} + {file.Qty2}**, **1.20 * {file.GrossSales}**, and **{file.Revenue}/49.95** respectively. These formulas all use Crystal Reports operators (+, * [multiply], / [divide]) and they're all easy to create and understand.

But not all of your information needs can be reduced to simple formulas; some needs require extensive calculations or manipulations. For example:

- You want to determine your average monthly unit sales for the last year, rounded to the nearest unit.
- You want to convert ounces of inventory to pounds and ounces, and have it appear in the format **x pounds y ounces**.

The formulas required to accomplish these activities require a fair amount of data manipulation: rounding, averaging, converting numbers to text, calculating remainders, etc. While some of the manipulations (averaging, calculating remainders) can be done using Crystal Reports operators alone, others can't be done without the use of functions. And even the ones that can be done without functions can be done more quickly and efficiently with them. (For additional information on formulas, see [Chapter 5, "Using Formulas,"](#) of this manual or search for *Formulas* in Crystal Reports Help.)

Functions

A function is a preset procedure or subroutine used to evaluate, make calculations on, or transform data. For example:

- The `NumericText` function evaluates the contents of a text field to see if it is a number, and
- The `UpperCase` function transforms all lowercase characters in a string to uppercase.

When you specify a function, Crystal Reports performs the set of operations built into the function without you having to specify each operation separately. For example:

- The `Average` function sums a list of values and divides the sum by the number of values in the list.
- The `DayOfWeek` function extracts the day component of a date, determines the day of the week the date falls on, and converts the day of the week to a number (1-7) where Sunday is the first day of the week.

By performing multiple operations with a single command, these kinds of functions are a kind of shorthand that make it easier and less time consuming for you to create reports. But not all functions involve lengthy calculations; some simply allow you to do things that you couldn't do easily without them while others take the drudgery out of report creation. For example:

- The `ToNumber` function converts a number that has been stored as text, to a number that can be used in calculations, and
- `TrimRight` removes all the spaces to the right of a string of data stored left-justified in a database.

How functions are used

Functions are used in formulas. In fact, a single function and its required argument(s) may be the entire formula. For example,

Abs ({file.TestResult})

is a perfectly acceptable, stand-alone formula for calculating the absolute value of the field *TestResult*.

Function syntax

Each function comes with its own set of usage rules (syntax). These rules must be followed for the function to perform correctly. If they are not, Crystal Reports displays a Formula Compiler Error message.

As an example, the correct syntax for using the *Average*([array]) function is:

Average ([array])

where *array* is an array of constants, field values or calculation results, separated by commas.

Translated, this means that to use the *Average*([array]) function correctly, you should enter:

Average

followed by a list of numeric values, separated by commas, with the list of values enclosed in brackets, and with the array enclosed in parentheses. Thus:

Average ([1,2,3,4,5])

is an example of the correct way to use the *Average*([array]) function.

If you try to use the function:

- Without separating the values by commas,
- Without enclosing the values in brackets,
- Without enclosing the array in parentheses,
- While including any unnecessary characters, or
- With values that are not numeric.

Crystal Reports won't accept the formula and will display a Compiler Error message identifying your error. (For additional information on functions, search for *Functions* in Crystal Reports Help.)

How formulas and functions are entered

Formulas and functions are entered via Crystal Reports' Formula Editor.

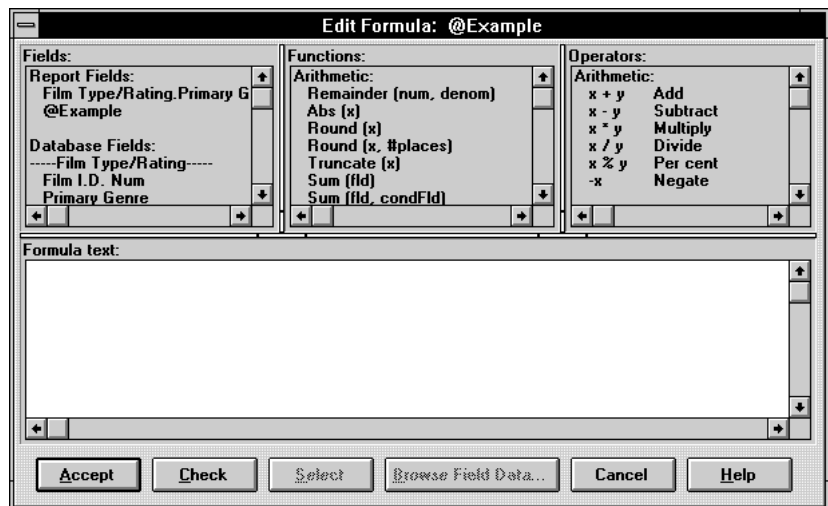


Figure 3-9. The Edit Formula dialog

The Formula Editor is a dialog box that contains all the tools you need to create and check the correctness of formulas. Using the Editor, you:

- Assign a name to your formula,
- Enter the formula,
- Check it to make sure you have entered it correctly, and then
- Accept it for use in your report.


When you accept it, Crystal Reports places the formula in your report in the position you selected for it. Then, when you print the report, Crystal Reports prints the results of the formula instead of the formula itself.

The Fields box

You can enter fields into your formulas in two ways: via the Fields box, or manually.

- To enter a field via the Fields scroll box, you move the I-beam cursor to the place you want to insert the field and click the left mouse button to set the text cursor at that point. Then you locate the field you wish to insert from the Fields scroll box list.
 - Fields already in use in the report are grouped at the top of the list; other available fields follow.
 - Formulas you have entered are listed next, their names preceded by the @ sign.
 - All other fields available in the active databases are listed last, grouped by database.

Select a field. Crystal Reports inserts the selected field (complete with the required syntax elements) at the text cursor.

 *You select an item from the Formula Editor scroll boxes (Fields, Functions, or Operators) by double-clicking it, or by Clicking it once to highlight it and then clicking the Select button at the bottom of the Editor to complete the selection process.*

- To enter a field manually, you locate the text cursor in the appropriate position and type in the field name as you would any text.
- The correct syntax for a database field name is:

`{file.fieldname}`

If you:

- Don't include the file name,
- Leave out the separating period, or
- Fail to surround the expression in braces,

Crystal Reports will generate a Formula Compiler Error message detailing your error.

- The correct syntax for a formula field is:

`{@formulaname}`

Operators and Functions boxes

You can also enter operators and functions into your formula in one of two ways: manually or via the Operators and Functions scroll boxes.

- To enter an operator or function manually, you locate the text cursor in the appropriate position and type in the operator or function as you would any text.
- To enter an operator or function via the lists in the Functions and Operators scroll boxes, you set the text cursor where you want the entry to appear in the formula.

Then you select the item of interest from the scroll box lists. Crystal Reports inserts the selected item in your formula, complete with any parentheses, brackets, or commas required.

Notes

For an array of items, only the first comma is included. As you enter additional items into an array, you will need to type in commas to separate the items.

You can resize the Formula Editor's Fields, Functions and Operator boxes to suit your needs. Simply place your cursor over the edge of one of the boxes until the normal cursor turns into **Double-cursor**, click on the box, and drag it to the desired size.

Order of precedence

When entering formulas that contain different kinds of operators, it is important to consider order of precedence, the order in which Crystal Reports performs the operations in your formula.

You learned simple order of precedence in high school math: when performing calculations, do multiplication and division first, then addition and subtraction. Thus:

$$5 + 10 \times 3 = 35$$

The calculation 10×3 is performed first to get 30. 30 is then added to 5 to arrive at the final answer.

Now, if your intention is to add 5 to 10 and then multiply the sum by 3, you have to modify the order of precedence with parentheses. You can do that thus:

$$(5 + 10) \times 3 = 45$$

It's clear that parentheses have a higher precedence than the add, subtract, multiply, and divide operators. They redirect the order of calculation.

You learned all of this in school and Crystal Reports follows the same rules of precedence. But Crystal Reports uses many additional operators, and it's important for you to understand the precedence Crystal Reports assigns to each so you can write your formulas to perform as expected.

- In the following list, Crystal Reports performs the top level operations first, then the second level, then the third, and so forth.

- When it encounters two or more operations that are on the same level, it performs them left to right.

Level 1	Parentheses, Array, IfThenElse
Level 2	Call, Subscript
Level 3	Identity, Negate, Dollar, Not
Level 4	Multiply, Divide, Percent
Level 5	Add, Subtract
Level 6	To
Level 7	Less than, Greater than, Greater than or equal, Less than or equal, In
Level 8	Equal, Not equal
Level 9	And
Level 10	Or

For a complete discussion of precedence (with examples), search for *Order of precedence* in Crystal Reports Help.

Using dates in formulas

Crystal Reports includes many useful functions for including dates and date ranges in formulas; you can learn more about those functions by searching for *Functions* in Crystal Reports Help. At this point, however, it's useful to know how to enter any date into a formula.

You enter a date simply by entering the *Date* function (manually or via the Function button) and then providing the date of interest in the parentheses that follow in the form YYYY,MM,DD (1992,01,01 = January 1, 1992).

The Formula checker

The Formula Editor also contains a formula checker which checks the syntax of your formula. If the syntax is incorrect, the formula checker points out the location of the problem and tells you what the problem is. You activate the formula checker by selecting the Check button. Crystal Reports also checks the formula automatically when you choose Accept.

When debugging formulas, especially if you have entered them manually, look carefully for the following:

- Missing quotation marks around text strings,
- Missing database name accompanying field names,
- Missing braces around database name/field name combinations,
- Missing closing parentheses to match opening parentheses,
- Case differences (the Formula Checker is case sensitive),
- If-then-else formulas that use different data types for the *then* and *else* actions, and
- Using **X** instead of * for multiplication.

The Formula Editor is easy to use and can be called up by selecting Formula from the Insert menu.

Developing complex calculations with formulas

Crystal Reports allows you to combine fields, functions, and operators to create complex calculations and manipulations of data. For example, to test the drawing power of two different offers, you can use a single Crystal Reports formula to send one offer to all customers with an even customer number and a second offer to all customers with an odd customer number. You can do some remarkable manipulations using Crystal Reports formulas.

Building formulas for complex calculations is an advanced topic. To see several examples of formulas created in Crystal Reports, please refer to the *Formulas in Action* topic in Crystal Reports Help. This topic presents a number of complex formulas that combine multiple functions and operators to solve real-world reporting problems.

Grouping, Summarizing, and Sorting your Data

Crystal Reports allows you to group, summarize, and sort your data to achieve the reporting results you want.

Grouping the data

A group is a set of records that are related to each other in some way. In a customer list, for example, a group could consist of all those customers living in the same ZIP code, or in the same state. In a sales report, a group could consist of all the orders placed by the same customer, or all of the orders generated by a specific sales rep.

Breaking data into groups (and then doing something to evaluate the group data, if you wish) is a key part of effective reporting. In fact, it's what separates a report from being just a presentation of raw data, and makes it a valuable communication tool instead. Crystal Reports allows you great flexibility in grouping data. It also gives you the ability to create a number of different kinds of group values.

Group values

A group value is the value generated as the result of an evaluation, a tally, or a calculation performed on data from a single group. A subtotal is one kind of group value; it is the sum of all of the values from a single field, from all the records in a group. In a sales report, for example, if you subtotal sales by sales rep, Crystal Reports gathers all the records that belong to the sales rep and totals the sales amounts from all the records. In a group average, Crystal Reports averages the values in a group of records; in a group count, it counts the values in a group of records, etc. Group values are important tools for creating powerful reports. Crystal Reports gives you several alternatives for working with group data. It enables you to:

- Calculate the sum of values.
- Calculate the standard deviation or variance of the values.
- Average the values.
- Count the values.
- Determine the highest value.
- Determine the lowest value in the group.


Grouping data with Crystal Reports

While there may be many data fields on a report, there is typically only one field for which you are interested in grouping the data. In a sales report, for example, it would probably be the field listing the amount of sales; in a commission report, it would probably be the field listing the amount of commission, etc. To group data you first select the field you want to group together.

Once the field is selected, you select the action you want to take on each group of data from that field:

- If you want to simply group the data and take no further action, you can select **Insert/Group**.
- If you want to subtotal it, you can select **Insert/Subtotal**.
- If you want to average, count, or determine the maximum or minimum value, you can select **Insert/Summary**.

Subtotals and summaries make up the category of group fields (search for *Insert Group*, *Insert Subtotal*, and *Insert Summary* in Crystal Reports Help).

 *The **Insert/Subtotal** command is simply a shortcut for setting up a summary that adds the values in each group.*

Once you have selected the group field and the action, you select another field (a sort and group by field) that triggers a grouping whenever its value changes. In grouping your data by state, for example, you would use the state field to create a new group (and generate a group value if selected) whenever the state changes. Likewise, the ZIP code field would trigger a grouping whenever the ZIP code changes.

Once you've made these simple selections, Crystal Reports does the rest. Your data will be grouped, and the group value (if you have selected one) will be calculated and will accompany each group.

Summarizing the data

Crystal Reports provides three easy-to-use summarizing options:

- **Grand Total.** A grand total adds all values in a field for the entire report and prints the sum on the last page.
- **Subtotal.** A subtotal is a partial total, a total of a specific, limited group of data in a field.
- **Summary.** A summary summarizes field data from a specific, limited group of records. It can total the data like a subtotal, but it can also average the values, count the values, or determine the highest or lowest value in each group or field.

All of these options are available on the Insert menu.

The summarizing process

The process of summarizing the data on your report follows these steps:

1. Selecting the number or dollar field you want to summarize.
2. Selecting the summarizing option you want from the Insert menu.
3. Finally, if you select Subtotal or Summary as a total type, the process will also include the following step:
4. Selecting the data field that triggers a new subtotal/summary whenever its value changes.

Selecting a field to total


To select the field you want to summarize, you click on it with a mouse. Crystal Reports puts handles on the selected marker to highlight it as selected.

Selecting a total type

To select a total type, you select it from the Insert menu or pop-up menu.

Selecting a field to trigger a new subtotal

If you select Subtotal or Summary as a total type, Crystal Reports asks you to indicate the field that is to trigger a new subtotal/summary whenever its value changes.

 *For additional information on subtotaling and summarizing data, please see Private Tutor.*

Sorting

There is a logic to the way values are arranged when they appear in a column on your report. Initially, they are arranged in the same order as the data appears in your database. But data can be sorted in a variety of ways:

- A mailing list, for example, could be sorted in ascending order, on the ZIP code field; that is, the customers would be sorted so that those with the lowest ZIP codes would appear first and those with the highest ZIP codes would appear last.
- It could also be sorted in ascending alphabetical order, on the last name field; that is, customers with last names beginning with A would appear first and those with last names beginning with Z would appear last.
- It could also be sorted by street address or customer first name if you had some practical reason for doing so.

Crystal Reports gives you the opportunity to change the existing sort order using the **Report/Record Sort Order** command. (Search for *Record Sort Order* command in Crystal Reports Help.)

Sorting by record

When you use the **Report/Record Sort Order** command, Crystal Reports asks you to select two things:

- The field you want your sort to be based on (sort field), and
- The sort direction.

Sort field

A sort field is a field that determines the order in which data appears on your report. Crystal Reports sorts field data using Windows' sort comparison algorithms, and it uses rules specific to the Country you select in the International section of the Windows Control Panel.

You can use any field as a sort field. A field's data type determines the method in which the data from that field is sorted:

Text

Text fields are sorted in the following manner:

- One character values are sorted so that blanks have the lowest value, then punctuation, then numbers, then uppercase letters, and finally lowercase letters.
- Then two character values are sorted, then three, etc. using the same rules. As a result:
 - “BOB” comes before “bob”,
 - “123” comes before “124”,
 - “ ” (blank) comes before “a”, and
 - “aa” comes before “aaa”

Dollars

Dollar fields are sorted in numeric order.

Number

Number values (120, or 5555) are sorted in numeric order.

Dates

Date fields are sorted in chronological order.

Booleans

Comparison fields are sorted so that false values come first, then true.

When you select a sort field, Crystal Reports sorts the values from that field.

Sort direction

Direction refers to the order in which the values are printed, once sorted.

- Ascending order means smallest to largest, 1 to 9, A to Z, False to True.
- Descending order means largest to smallest, 9 to 1, Z to A, True to False.
- Specified order means user-defined.
- Original order means how data is currently organized in the database.

For further information on sort direction, refer to Crystal Reports Help.

Single field sorts

Single field sorts are sorts in which all the data in the report is sorted based on the values in a single field. Sorting an inventory report by stock number and sorting a customer list by customer number are examples of single field sorts.

Multiple field sorts

In multiple field sorts, Crystal Reports first sorts the entries (alphabetic or numeric) in the first field selected, putting them in ascending or descending order as specified. Then it sorts any entries in the second field that can be sorted *without disturbing the sort order of entries in the first field*. It then sorts any entries in the third field that can be sorted *without disturbing the sort order of the entries in the first two fields*. It follows the same pattern for sorting additional fields.

Sorting groups

Crystal Reports allows you to change the order in which groups appear on your report. You can:

- Base the sort on any group (subtotal or summary) in your report, and
- Sort your report so that group field values appear in ascending, descending, specified or original order.

You change the sort order using the **Report/Group Sort Order** command. (Search for *Group Sort Order command* in Crystal Reports Help). When you sort by group, nothing happens to the sort order of the records within a group; only the relative positions of the groups themselves change.

 *For additional information on sorting and examples of single field, multiple field, and group sorts, please see Private Tutor.*

Editing and Formatting the Data

Crystal Reports makes it easy to edit and format your data. The editing/formatting process follows these steps:

1. Selecting the data you want to edit or format.
2. Selecting the editing or formatting action you want to take place.
3. Entering the specifics of the action in the dialog box/editor if/when it appears.

Selecting the data

To select the data element you want to edit or format, you click on it with your mouse. Crystal Reports draws handles on the element marker to highlight it as selected.

Selecting the action

Once the element is selected, you select the editing or formatting action from the Edit or Format menus. For example:

- To change the font used to print the data, select Font from the Format menu,
- To hide the field when printing, select Field from the Format menu, or
- To modify a formula, select Formula from the Edit menu.


For detailed instructions on making these changes, search for *Format Font*, *Format Field*, and *Edit Formula* in Crystal reports Help.

Entering the specifics

In those cases where a dialog box or editor appears after you've selected an action, you enter the specifics of that action in the window that appears. For example:

- In the Font dialog box, you enter the font and point size you wish to use, and indicate whether you want the data to appear in boldface or italics, or whether you want it to be underlined or overprinted with the strikeout character, and
- In the Formula Editor, you make the changes you want to the formula that appears, check those changes if you wish, and accept the revised formula when you're finished.

Crystal Reports takes it from there and performs the action you selected.

 *In some cases you have to specify a second action to complete the editing change desired. For example, to move some text in your report, you first cut the text from its current position, and then you paste it in its new position. In such a case you select the data and then the action (Cut) to cut the text to the clipboard. Then you mark the new position using the insertion pointer and select Paste to insert the text in the new position.*

Adding Graphics and OLE Objects

Crystal Reports enables you to add a number of graphic enhancements to your reports. You can add:

- Lines and boxes to group or separate your data, to emphasize items, or to create simple graphic designs, (Search for *Insert Line command* and *Insert Box command* in Crystal Reports Help.)
- Borders and colors to clarify or call attention to individual report elements and to make your report more visually pleasing, (Search for *Format Border and Colors command* in Crystal Reports Help.)
- Bit-mapped graphics to display your company logo, product pictures, or other artwork, and
- OLE objects to embed or link images and data from spreadsheets, paint programs, graphing programs, and other OLE 1 and OLE 2 object applications. Once you have placed an OLE object, you can edit it in its originating application simply by double-clicking the object.

Add the graphics and OLE objects you need. With some careful planning and some creativity, you can make your reports more pleasing to read and you can deliver your data with more impact. (See *Topics on Graphics and OLE* in Private Tutor)

Specifying Records/Groups to be Included

When you select a field to appear on your report, Crystal Reports, by default, prints field values from every record in the selected database. But in many cases you may not want to include all the values, but only a specific range of values. For example, you may want to include only a specific group of customers or a specific range of account numbers out of the total number of values in the database. Or you may want to include values from only those records that fall within a particular date range. With Crystal Reports this is easy. The program includes a number of commands on the Report menu for restricting your report to specific records or groups of records:

- **Select Records Expert.** This option allows you to limit your report to specific records or groups that fit a condition or conditions you specify. It automatically builds a selection formula using your responses to dialog box questions. If you have a record highlighted when you call up this command, the dialog box comes set for selecting records. If you have a group highlighted, the dialog box comes set for selecting groups. This option requires no knowledge of the Crystal Reports formula language. (Search for *Select Records command* in Crystal Reports Help).
- **Edit Selection Formula/Record.** This option also allows you to limit your report to specific records that fit a condition or conditions you specify. It takes you to the Formula Editor where you can manually build a record selection formula to fit your needs. This command is intended for users who are familiar with the Crystal Reports formula language. (Search for *Edit Record Selection Formula* in Crystal Reports Help).
- **Edit Selection Formula/Group.** This option also allows you to limit your report to specific groups of records that fit a condition or conditions you specify. It takes you to the Formula Editor where you can manually build a group selection formula to fit your needs. This command is intended for users who are familiar with the Crystal Reports formula language. (Search for *Edit Group Selection Formula* in Crystal Reports Help).

You select the command, specify the records or groups of records you want included, and your report prints using only the selected records or groups.

Printing the Finished Report

When you want to print your report or when you want to see what your report will look like when printed, you can use the six printing options:

- Printing your report using a subset of the data. When designing the report you can print only a page or two of data to see how the report looks and then print the full report when everything is ok. (Search for *Preview Sample command* in Crystal Reports Help.)
- Printing to the printer for hard copy output. (Search for *printing your report* in Crystal Reports Help.)
- Previewing and fine tuning your report in the Preview window. (Search for *printing your report* in Crystal Reports Help.)
- Printing to a disk file for use with other applications or to E-mail to someone else. (Search for *printing your report* in Crystal Reports Help.)
- Printing the report definition. (Search for *printing the report definition* in Crystal Reports Help.)
- Printing your report to an executable file. (Search for *executable file* in Crystal Reports Help.)

Distributing Reports

Crystal Reports uses a variety of different files to create reports to your specifications. The files are determined by your reporting requirements.

When you want a report to run on another machine that doesn't have Crystal Reports installed, it is necessary for you to supply all of the files that are required to run the report. Crystal Reports 4.5 Distribute Reports capabilities makes it easy for you to assemble all of the appropriate files.

Distribute Reports is available two ways:

- **Linked to the Report/Compile Report command**
When you compile a report for distribution, the program asks you if you want to distribute the report once it's compiled. If you do, it calls up the Report Distribution Expert when the compiling is complete.
- **As a stand-alone menu command (Report/Report Distribution Expert)**
Whenever you want to distribute a saved report, you can call up the Report Distribution Expert to pull together the files you need to distribute with the report.

The Report Distribution Expert asks you what reports you want to distribute, if you want to include database files and formatting DLL's, and where you want the distribution files sent. Then, when you tell it to build, it builds a list of all the required files for your review. You review the list, remove the files you don't want to distribute, add any additional files that the distribute report processor hasn't determined to be necessary but you would like to ship, and then send the selected files (including your report[s]) to your distribution destination. It's a very simple procedure.

The Distribute Reports expert:

- Ships data with the report if required
- Compresses the component files, and
- Builds a setup.exe file.

The user can use the setup.exe file to install the report(s) you're distributing. The user runs setup.exe like any other setup program. Crystal Reports decompresses the files, installs them where the user wants them, and even creates an icon for calling up the report.

You can use the Distribute Report Expert whenever you:

- Compile reports.
- Save reports to a disk file for distribution.
- Send a report to a network drive so many people can use it.
- Ship reports with an application you develop using the Crystal Print Engine.

It's a valuable tool for anyone who creates reports for others.

4

Tutorial—Movie List

Overview

The following tutorial has been designed to give you confidence when creating your first reports with Crystal Reports.

You begin by learning the basic concepts - calling up a database, placing some fields on your report, and understanding the grid that controls the placement of report elements.

You will also learn how to:

- Navigate that grid using both the mouse and the keyboard.
- Move and delete fields.
- Get the data fields lined up the way you wish.
- Display your report to the Preview Window so you can fine-tune your work.
- Summarize data.
- Limit the records you want included in the report.

Notes to consider

For the purposes of standardizing this tutorial over the widest variety of computer systems, we recommend that you activate the PostScript printer driver before you begin. You can activate that driver via the Printers icon in the Windows Control Panel. If you don't have the PostScript driver installed on your system, Click the Add Printer button in the Printers dialog box and install a PostScript printer from the list that appears. If you don't have a PostScript printer, you won't be able to print your tutorial reports on paper, but they should print to the Preview Window just fine.

This tutorial assumes you are familiar with Microsoft Windows and uses conventional names and procedures common to the Windows environment. If you are not familiar with Windows, you may have trouble understanding basic procedures such as scrolling and clicking. Please refer to the documentation that came with Microsoft Windows for further explanation of these procedures.

The term Click used throughout this tutorial, unless otherwise stated, means to press down on the left button on your mouse or trackball, then release the button. Drag means to press down on the left mouse button and hold the button down while you move the mouse.

The Times New Roman font has been used in creating the report in this tutorial. If that font is not available to you, you can use any font you choose. Be advised, however, that field size, field spacing, and screen displays will be different with a different font. In this tutorial we use 10 point Times New Roman for standard report data.

Make sure that the default font for all report sections is set to 10 point Times New Roman before beginning this tutorial. For instructions on doing this, search for Font Options in Crystal Reports Help.

Movie List Report

An example of a basic business report is a Movie list; a list of Movie titles and related information.

- We're going to learn first how to create a rows and columns list, with one movie (record) per row.
- Then we're going to see how to convert that list into a different format, with all of the data about each movie grouped in a block, similar to a mailing label.

Getting Started

This section introduces you to the Crystal Reports environment and shows you how to begin putting together a simple report. In this section, you'll learn about:

- Crystal Reports' screen, Menu bar, Button bar, Format bar, and Status bar,
- The Design window and how it's designed for ease of use,
- The field box that Crystal Reports uses in the Designer to represent fields and formulas,
- The grid that helps you place report elements with precision, and
- The concept of “snapping to grid.”

You'll also learn how to:

- Activate a database for use in the report,
- Select fields from the activated database,
- Place report elements where you want them to appear on a report, and
- Reposition report elements to fit your needs.

We'll begin at Crystal Reports' main screen.

Crystal Reports' main screen


Use the procedure below to use Crystal Report's main screen.

Step

Action

1. Double-click the Crystal Reports icon.

Response: The Crystal Reports' window appears. You'll see the Crystal Reports title bar at the top of the screen, the Menu bar below it, the Button bar immediately below the Menu bar, and the Format bar and the Status bar at the bottom of the screen.

 *If you have not yet registered your copy of Crystal Reports, the Registration screen will appear before the Crystal Reports window. Follow the directions on the Registration screen to register your copy of Crystal Reports. Registering your software provides you with Customer Support from qualified technicians when needed and free information about upgrades in the software.*


The Menu bar along the top of the screen contains all of the commands you need for creating your reports.

2. Click on each of the menu names in turn to get a brief overview of the menu options. You will note that most of the menu items are grayed-out because they are inactive when you are not creating or editing a report.
3. Now click on the File menu.


Response: When the menu appears, New is highlighted.

Action: Press the DOWN ARROW key on your keyboard once to highlight Open. Look down at the right side of the Status bar, and you'll see a few words telling you what the Open command does.

4. Using the DOWN ARROW key, move the highlight down the list of commands on the File menu. You'll see each command described on the Status bar when it is highlighted.

 *The Status bar does not give descriptions of the New and Print commands on the File menu since each of these commands opens a submenu with several related commands grouped together. The commands on the submenus, however, are described in the Status bar when each is highlighted.*

5. Now click on the Help menu and look at the first few commands available there. These commands give you access to Crystal Reports extensive on line Help file.

 *If you need more information about a particular feature or procedure in Crystal Reports, you can find it using the on line help.*

6. The Help menu also gives you access to Private Tutor.

Private Tutor can give you step-by-step instructions on how to perform a particular procedure while you continue to work on your own report. When you select *Building a Report* from the Private Tutor opening screen and the Private Tutor window opens, it appears on the right side of your screen on top of your report so that you may follow the instructions as you perform the work in Crystal Reports. Be sure to select the *Learning About Private Tutor* option on the Private Tutor opening screen to learn more about using Private Tutor with Crystal Reports.

7. Click somewhere outside the menu (or on the menu name itself) to close the Help menu when you are finished.
8. The buttons on the Button bar each represent one of the most common menu commands. Clicking a button has the same effect as selecting the corresponding command from the Menu bar. Move the cursor onto the Button bar. When you position the cursor on a button, the Status bar identifies the button function.
9. The Format bar, at the bottom of the screen, lets you make quick formatting changes to fields and text. You use the tools on the Format bar to change font, font size, and font style, align fields, and format numbers.

Selecting a database to use

Follow the procedure below to select a database to use.

Step

Action



1. To begin creating your first report, click the New Report button on the Button bar.

Response: The Create New Report Gallery appears. We're going to build a report using data stored in a database file.

Action: To build this kind of report from scratch, click the Custom button.

Response: The Report Gallery expands.

The Report Gallery contains a number of buttons. Many of which call up Experts that guide you through the creation of specific kinds of reports. Since we want to learn reporting concepts here, we'll skip the Experts and build our report from scratch. After you've completed this tutorial, you may want to build some reports using the Experts to decide which method of report construction you're most comfortable with.

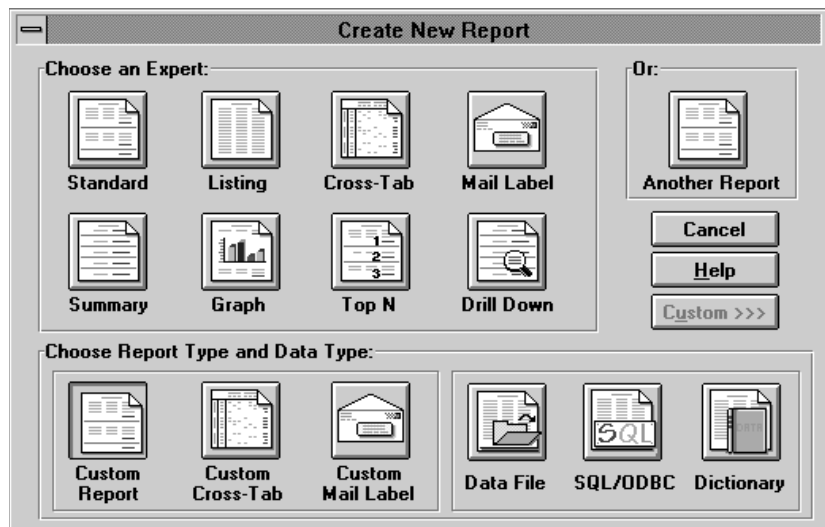


Figure 4-1. Create New Report dialog

- At the bottom of the Report Gallery, select the Custom Report icon and then the Data File icon. You select Data File as your data source whenever you want to create a report from a standard database file.

Response: The Report Gallery disappears, and the Choose Database File dialog box appears.

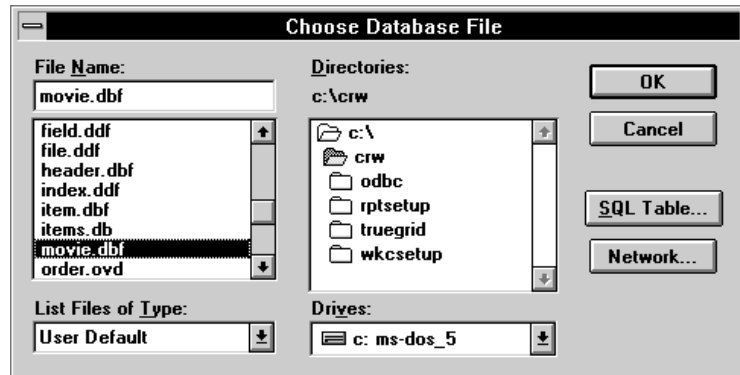


Figure 4-2. The Choose Database File dialog

You will use this dialog box to select the database you'll use in creating your first report.

- Using the File Name and Directories boxes, select the file movie.dbf. It was installed in the CRW directory (or other directory of your choice) when you installed Crystal Reports.
- Click OK to open the file in Crystal Reports.

Response: The Choose Database File dialog box disappears and the Design window appears in a report window titled *Untitled Report #1*, on a tab titled *Design*.

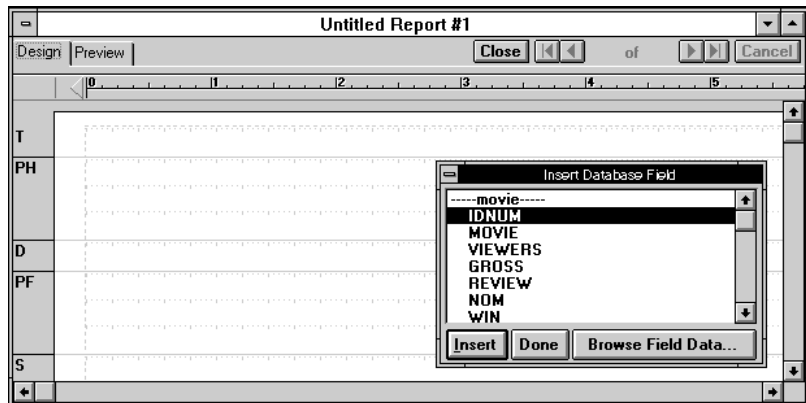




Figure 4-3. The Design window

 *Crystal Reports uses an alias name for a database table. An alias is a simple name used to identify a database for the purposes of the report. Crystal Reports is preset to use the default alias (the file name without the extension) for any active database. For example, YEAR has the alias movie. If you have toggled the Use Default Alias checkbox off in the Options dialog box, the Alias dialog box will appear here and every time you activate an additional database. You can use that dialog box to change the alias for the selected database if you wish. For information on aliases, search for alias in Crystal Reports Help. For information on using/not using default aliases, search for default alias in Crystal Reports Help*

About the Design window/report sections

The Design window is divided into five sections: **Title**, **Page header**, **Details**, **Page footer**, and **Summary**. As you select elements for your report, you place the elements in whatever section of the report you want them to appear. If, at any time, you are unsure of the report section you are working in, scroll to the left side of the Design window, and review the section names. You'll feel better oriented as you work with the program.

 If you have already activated the *Use Short Section Names* checkbox in the Options dialog box prior to reading this tutorial, the Title, Page Header, Details, Page Footer and Summary section names will appear as T, PH, D, PF and S respectively. We will learn how to make changes in the Options dialog box later. For now, realize that PH on your screen represents Page Header, and so on.

The Insert Database Field dialog box appears on screen with the Design window.

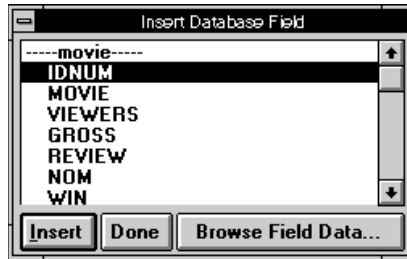


Figure 4-4. The Insert Database Field dialog

This dialog box appears automatically because it's almost certain you will want to insert database fields when you create a new report.

This dialog box is set to remain on screen until you click the Done button. All of the fields available for use in your report are listed in this box. Since you have activated only a single database, *Movie*, only the data fields from that database are listed at this time. Note that the alias *movie* appears at the top of the list to indicate the source of the fields that follow.

You can move the dialog box to another location on the screen by clicking on its title bar and dragging it to the new location you desire. You can also resize the dialog box if you wish, making it easy to see all fields in the database.

Linking two databases

We need data from two databases to create this report. We've already activated the Movie database. Now we need to activate the Studio database and we'll link the two databases together. When we link, we use a field that is common to both databases. The program then uses the link to match up records from one database with those from the other. The link assures that the data in each row of the report refers to the same Movie. Follow the procedure below to link two databases.

Step

Action

1. To activate the second database, select **Database/Add Database to Report**.

Response: The Choose Database File dialog box appears.

2. Select the file studio.dbf. It was installed in the CRW directory (or other directory of your choice) when you installed Crystal Reports. Click OK.

Response: The Visual Linking Expert appears and displays the two tables you have selected for your report.

Action: An arrow should appear between the two tables and should point at the *MOVIE* field in each table. If the arrow does not appear, click the Smart Linking button on the Visual Linking Expert. Smart linking decided that the *MOVIE* field contained similar values in each database and suggested that field as a link. That's the link we want. Click OK to return to the Design window. The Insert Database Field dialog box is updated, and now contains all fields from both databases.



If you have disabled the Auto Smart Linking option on the File|Options Database tab, the two databases will not be linked together (indicated by the absence of the Visual Linking link line) in the Visual Linking Expert dialog box. To link the two databases, simply Click the Smart Linking button.

Inserting a database field

The active database is now a combination of two separate databases that you have linked together: a list of movies, studios, and related information. We're ready to create our first report. Follow the procedure below to insert a database field.

First, let's familiarize yourself with the dialog box. Highlight a field name in the dialog box by clicking the name once. When you highlight a field name, you can review the values for that field, and the field type and size, if you wish, via the Browse Field Data button. When you click that button, a scroll box appears listing field values for the selected field. When you finish reviewing the data in the dialog box, click the Done button to return to the Insert Database Field dialog box.

Now that you know how the dialog box works, double-click the field *movie*. *MOVIE* on the list in the dialog box, and a white rectangle appears in place of the arrow cursor. This is how you select a field. Alternative methods for selecting fields from the dialog box are to click a field name once to highlight it and click the Insert button to complete the process, or to drag and drop a field into place on your report, a technique which we will learn a little later.

When the cursor enters the Design window, the rectangular cursor disappears and a field box appears beside an arrow cursor.

- The field box represents the element you have just selected for placement.
- The size of the field box approximates the size of the field selected.

Move the field box as far left as you can in the Details section. Note that the field box won't go any further left than the dashed gray line at the left of the Details section. That dashed line is the default page margin. You cannot place any report elements outside that margin. We'll use the default margin settings for our report. (For information on page margins, search for *Page margins command* in Crystal Reports Help.)

With the field box butted up against the left margin in the Details section, click the left mouse button to place it. A box containing Xs appears and a text field box containing a column heading (*MOVIE*) appears in the Page Header section directly above the field box.

 *The column heading, by default, is the name of the field selected.*

Your screen should look similar to the following:

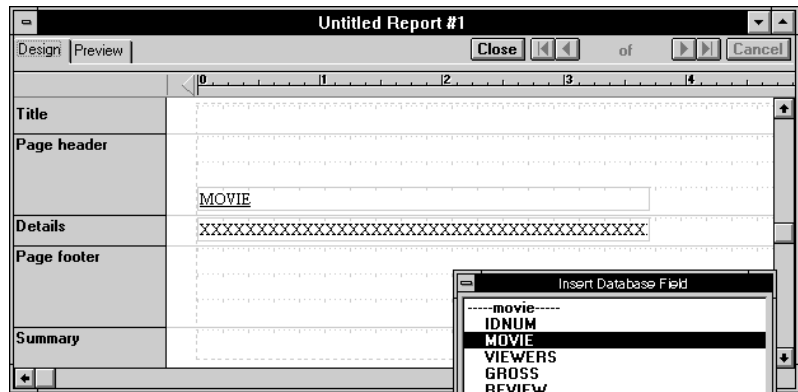


Figure 4-5. Untitled Report window

Understanding fields

Before we go any further, let's take a look at the field you just placed in the Details section.


- First of all, the field box indicates that, when your report is printed, a field value will appear where the box is positioned.
- The Xs in the field box (the field picture) indicate that the box represents a string field (a field with the data type *string*). Other data types have different field pictures.
- The number of Xs in the field box is the *data width*, the maximum number of characters in the field as defined by the database.
- The width of the field box is the *field width* (the amount of space allocated to the field for printing) or the size of the heading (if it is wider than the field).
- You can change this width. Initially it is set to the width needed to display the maximum number of characters in the field (using the font selected for the field).
- The size of the Xs indicates the point size selected for the characters in the field.

- The font and style (Bold, Underline, etc.) used in displaying the Xs indicate the font and style selected for the characters in the field. We'll learn how to make changes to these attributes later in the tutorial.
- The line spacing is adjusted to the point size selected for the characters in the field.

Handles, selecting fields

There is something else about the field box. It has handles (boxes) on its right and left edges. (Field boxes always appear with handles when first placed.) These handles indicate that the field is selected, and therefore active. To do anything with a field (change the font, move it, etc.), you first have to select it.

- Move the I-beam cursor away from the field and click an empty part of the window. The handles disappear.
- Now position the cursor inside the field box and click.

 *The I-beam cursor changes to an arrow cursor when it is inside a field.*

- The handles reappear. That's all there is to selecting and deselecting a field.

The Design Window grid


Follow the procedure below to learn more about the Design window grid.

Step

Action

1. We'll begin by dragging the field to a new position. To drag a field, position the cursor inside the field, depress the left mouse button, and keep it depressed as you move the mouse (and thus the field) to a new position.

Response: When you release the mouse button, Crystal Reports fixes the field in its new position.

 *The field (column) heading does not move when you move the field.*

2. Drag the field an inch or so to the right and release the mouse button.

Response: The field stays where you moved it.

3. Now drag the field to the far right edge of the Details section and keep on dragging it even though it looks like there's no place to go.


Response: The report scrolls automatically if your cursor touches the edge of the Design window while you are dragging a field.

4. Drag the field into the Page Header section and release the mouse button.

Response: The field stays there too. With a few exceptions, a field can be moved anywhere within a section or into other sections, and it will print in its new position in the finished report.

Snapping elements to the grid

Now that the field is selected, let's take a look at the grid that Crystal Reports uses to position report elements. At first, the Design window looks very free-form. It looks like you can place anything anywhere and hope for good results. But that is not the case. Laying out a report is very logical. Let's see how. If you have toggled off the Show Grid in Design window checkbox on the Layout tab in **File/Options**, the grid will be invisible in the Design window. However, Crystal Reports will still use the grid even though you can not see it. By default, Show Grid in Design window is toggled on.

 *The grid size can be changed. Select File|Options, and the Layout tab appears in the File Options dialog box. Simply enter the desired grid size in inched in the Grid Size edit box. Make sure the Snap to Grid in Preview Window and Snap to Grid in Design window checkboxes are toggled on. They are located on the Layout tab in **File/Options**.*

When you moved the field you probably noticed that the field moved in tiny jumps. This is because fields and other report elements move on an invisible grid. What this means is, you can't place fields hit-or-miss on your report; you can only place them in grid locations. However, if the Snap To Grid checkbox is toggled off in **File/Options** on the Layout tab, you can place fields outside of the grid locations. By default, Snap To Grid is toggled on. Crystal Reports is set up this way to help you move, resize, and align report elements with ease and precision.


Moving elements using arrow keys

Once a field is selected, you can also move it with the arrow keys on your keyboard. Each time you press an arrow key, Crystal Reports moves the field one grid position in the direction of the arrow. You may find that you have better control of the fields using the arrow keys to position them instead of the mouse. Follow the procedure below to move elements using the arrow keys.

Step	Action
1.	Try moving the field using the arrow keys. Press the up, down, left, and right arrow keys, and watch how the field moves in the Design window.

Response: If you hold an arrow key down, the field will continue to move until you release the key. Notice that the status bar in the lower left hand corner of the screen indicates the field position as you move the field.


- | | |
|----|--|
| 2. | Finally, move the <i>MOVIES</i> field back to the left margin of the Details section where you originally placed it. |
|----|--|

 *The report window does not scroll automatically when you move fields off the edge using the arrow keys.*

Moving elements using the positioning wand

Another way to move a field is by using the positioning wand, located directly below the ruler. Follow the procedure below to move elements using the positioning wand.

Step	Action
1.	To move a field using the positioning wand, select the field. (Make sure that the resizing handles appear on the field.)
2.	Position the cursor on the positioning wand.
	Response: The cursor changes to a hand cursor.
3.	Click and drag the wand to the right or left on the report page. When you are satisfied with the placement of the field, release the mouse button.
4.	The field appears in the new location on the report page.

 *If you have turned off Show Ruler in Design window, or Show ruler in Preview Window, the positioning wand will not be available in the window that you have toggled the option off for.*

Adding additional fields

Follow the procedure below to add additional fields.

Step	Action
1.	Let's add two more fields to the report. This time, we'll add them at the same time. Go back to the Insert Database Field dialog box. This time, click the <i>studio.YEAR</i> field, then press the Shift key on your keyboard. Holding the Shift key down, click the <i>studio.COUNTRY</i> field. Release the Shift key.

Response: Notice that both fields remain selected. Use the SHIFT-CLICK combination allows you to pick a continuous range of fields. You can use the CTRL-CLICK combination to pick several fields from the list that may not be adjacent to each other.

2. This time, we'll drag the fields onto the Design window and drop them in place. Click either of the highlighted field names, and hold the left mouse button down.
3. Keeping the mouse button pressed, move the cursor on to the Design window.

Response: The mouse cursor changes to the Drag-and-drop cursor as soon as it begins to move.

4. Position the cursor close to the right edge of the *MOVIE* field in the Details section of the Design window (the first field you placed in the report). Release the mouse button.

Response: Both of the fields appear in the Details section on your report in the same order they are listed in the Insert Database Field dialog box. Field headings also appear in the Page Header section above each field. Your screen should now look similar to this:

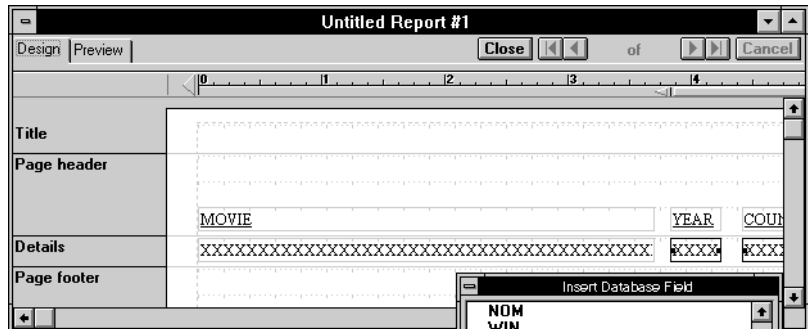



Figure 4-6. The Design window

5. Whoa! That's a lot of Xs. To make our work easier, we'll set the field boxes to display the field names, and shorten the section names at the left side of the report. Select **File/Options** from the Menu bar.

Response: The Options dialog box appears with the Layout tab selected.

 *If you toggled the Show Field Names checkbox on prior to reading this tutorial, field names already appear in your field boxes. If so, disregard Step 6 below.*

6. Click the Show Field Names checkbox to toggle the option on. A check mark appears in the checkbox.

Response: This option replaces the Xs in each field box with the actual name of the field.

7. Now, click the Use Short Section Names checkbox to toggle it On. If it has already been toggled On, disregard this step. This option will make more working room in the Design window for our next step. Click the OK button to return to the Design window. Notice that the white working space in the Design window is expanded.

Selecting multiple fields

Follow the procedure to select multiple fields.

Step	Action
1.	We need to align the fields next to each other, leaving no excess white space, and making sure we have room to fit the rest of our fields in place. First we'll deselect the fields so we can work with them individually. Move the cursor outside of the fields until it changes to an I-beam cursor. Click once to deselect all of the fields.
2.	Now, hold the SHIFT key down and, in the Design window, click the YEAR field and its heading. You have selected both fields at the same time.
3.	Move both fields to the left until they are touching the right edge of the MOVIE field and field heading. You can do this using the arrow keys or by dragging either one of the fields with the mouse. Both the field and field heading will move to the left at the same time.

Selecting fields with the Selection tool

Follow the procedure below to select fields with the Selection tool.

1. Now, we'll repeat the process with the *COUNTRY* field and field heading. This time, though, we'll use a new technique to select the fields.



2. Choose the Select Fields button from the Button bar.

Response: The mouse cursor changes to the Select cursor (crosshair).

3. Move the cursor to the upper left-hand corner of the *COUNTRY* field heading in the PH (Page Header) section. Click and drag the cursor in a diagonal direction to the lower right-hand corner of the *COUNTRY* field in the Details section.

Response: As you drag, a rectangle will appear surrounding the two fields.

4. When both fields are enclosed by the selection rectangle, release the mouse button. The rectangle disappears, and both the field and field heading are selected. This is known as lassoing or marquee selecting multiple fields.
5. Finish by moving the *COUNTRY* field and field heading to the left until they are next to the right edge of the *YEAR* field and field heading, then deselect the fields by clicking with the I-beam cursor outside any of the field boxes.

Reviewing your work

Follow the procedure below to review your work.



1. With three fields placed and positioned, let's see how your report looks. Click the Print Preview button on the Button bar to open the Preview Window.

Alternatively, you can select **File/Print Preview** or click the Preview tab next to the Design tab and Crystal Reports opens a Preview Window displaying your report.

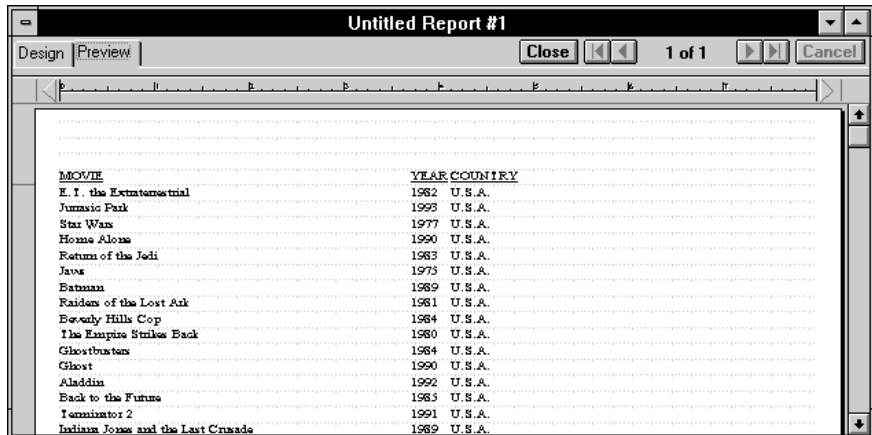


Figure 4-7. The Preview window

2. Scroll through the Preview Window to see more of your report if you wish.
3. You have the beginnings of a movie list report, but you still have another field to add. Note that the arrow buttons in the Preview Window are all grayed out, indicating that they're inactive, while some buttons are darkened, indicating they're active.

Right now, this report is only one page long, and you are currently viewing the first page. The arrow buttons in the upper right corner of the Preview Window allow you to page forward and backward through the report. When there is more than one page to the report, the arrow keys will be active.

Adding the last field

Follow the procedure below to add the last field to your report.

- | Step | Action |
|------|--|
| 1. | <p>When you are finished looking at your report, return to the Design window by clicking once on the tab titled Design in the upper left hand corner of the Preview Window.</p> <p>Response: The Preview Window disappears and the Design window appears again.</p> |
| 2. | <p>In the Insert Database Field dialog box, click the <i>movie.GROSS</i> field.</p> <p>Response: The <i>movie.GROSS</i> field is now highlighted, indicating that it is selected.</p> |
| 3. | <p>Drag the field into the Design window just to the right of the <i>COUNTRY</i> field in the D(etails) section.</p> <p>Response: Release the left mouse button, and the field appears in the D(etails) section with field heading in the PH (Page Header) section.</p> <p>Action: You may have to scroll the window to the right to see all of the new field.</p> |
| 4. | <p>If there is a gap between the <i>GROSS</i> field and its field heading and the <i>COUNTRY</i> field and its field heading, use the selection tool to select and move the new field and its field heading so that the left edge of each field box touches the right edge of the field box before it.</p> |
| 5. | <p>When you are finished, deselect any active fields by clicking the I-beam cursor outside any field boxes, and click the Preview tab in the upper left hand corner of the Design window to return to the Preview Window and look at the placement of your fields.</p> |

Balancing field spacing

Follow the procedure to balance field spacing in your report.

Step

Action




1. The Preview Window is currently in Enhanced Page mode, the default mode anytime you open the Preview Window. Click the Zoom button on the button bar once.

Response: The screen changes to Fit Width mode. Now we can see the entire width of the report in the window at once.


It looks as if there's more than enough white space on this page, and you might be fine with the spacing as it stands. But it might be more readable if the columns were spread out a little bit. Now you might wonder, if the field boxes were all touching each other, where did all the white space come from? The white space occurs because the data in each of the fields is far shorter than the amount of space allotted for that data in the report. There is clearly some excess space that can be filled.

2. To fill the space, we're going to resize the fields and field titles. First we want to resize the *MOVIE* field and its matching title. Return to the Design window by clicking once on the Design tab. Click the *MOVIE* field. Now, use the SHIFT-CLICK combination to select the *MOVIE* field title in the PH (Page Header) section. Handles appear on both of the field boxes.
3. Move the mouse over the handle on the right side of one of the selected field boxes. It doesn't matter which field box you choose. When the resizing cursor appears (a double-headed arrow), drag the sizing handle on the field box to the left about an inch. Both field boxes get smaller, and a gap opens up between the *MOVIE* fields and the *YEAR* fields.
4. Now click the *YEAR* field and SHIFT-CLICK its field title. Move them to the left with the arrow keys until they touch the edge of the *MOVIE* fields.

 *When selecting several fields using the SHIFT-CLICK combination, always click the first field in the group you are selecting without holding the SHIFT key down. This deselects any previously selected fields that you don't want to change. Hold the SHIFT key down to select the rest of the fields in the group you are selecting.*

5. Click outside the field boxes to deselect your fields. Using either the SHIFT-CLICK combination or the selection tool, select the *GROSS* field and its title. With the mouse cursor inside one of the field boxes, drag both fields to the right about one and one half inches.
6. Now select the *COUNTRY* field and its title and drag both fields to the right until they're one half of an inch away from the *GROSS* field and its title.
7. Click the Preview tab and review your work again. You may want to click the maximize button in the upper right hand corner of the window to see more of your report on screen. As you can see, the spacing is much better. Now you know how to resize and space fields as needed.

Notice that all of your tools and commands are still available to you in the Preview Window. You will find that sometimes it is more convenient to work on real data in the Preview Window, while other times it is more convenient to work with field boxes in the Design window.

 *Maximizing the Preview Window is useful for viewing a larger area of your report, and you may wish to leave these windows maximized. The figures used in this tutorial, however, do not show maximized windows and will not illustrate the large area visible in a maximized window.*

Saving your report

Follow the procedure below to save your report.

Step

Action



1. Click Save to save the work you have done on the report to date.

Response: Since this is the first time you're saving the report, the File Save As dialog box appears now with the directory already set to where the database resides.

Action: You can also select **File/Save** to save your work to date.

2. Type the report name MOVIES.RPT in the Filename box and click OK.

Response: Crystal Reports saves your report to the C:\CRW directory or the directory you installed Crystal Reports in, and displays the new report name on the report window title bar.

Working with Text and OLE Objects

Text is often used in reports to describe field data and formula results. It is also used to title the report, and to provide important header and footer information.

OLE is a special feature that lets you increase the power of your report by inserting data that has been created by another application and lets you edit that data from within your report.

This section shows you how to insert text into your report by typing it in a text field, and how to insert and edit a simple OLE object. You'll learn how to:

- Insert text using a text field.
- Change the font and point size of the text.
- Center the text horizontally on the page.
- Insert a Paintbrush graphic as an OLE object.
- Edit the OLE object from Crystal Reports.

We'll begin by inserting a simple report title.

Adding titles using text fields

Follow the procedure below to add titles to your reports using text fields.

1. The report looks pretty barren without a report title, so it's time for you to add one. We'll use a text field to enter and center the report title, and we'll do our work this time in the Preview Window. Click the Zoom button to show your report at the highest magnification, if it is not already at the highest magnification. This will make it easier to see our work while we add the report title.



You can also add text to your report by typing it at an insertion point placed in the Design window. In this report, however, we want to center the report title, and the easiest way to do that is to enter the text via a text field.



2. To create the text field for the report title, select Insert|Text Field or click the Insert Text button on the Button bar.
3. Type “*Studio Earnings*” in the Edit Text Field dialog box when it appears, and click the Accept button when finished.

Response: An empty field placement box and arrow cursor appear.

4. Position the field box in the title section of your report against the left margin. The placement box will not go to the very top of the report or the very left of the report because of the invisible page margins, but position the field as far as you can in the top left corner. Click the left mouse button.

Response: A field box appears displaying the text you just entered.

5. While the field is selected (handles showing), move the cursor inside it and click the right mouse button.

Response: A pop up menu appears.

6. Select Change Font.

Response: The Font dialog box appears.

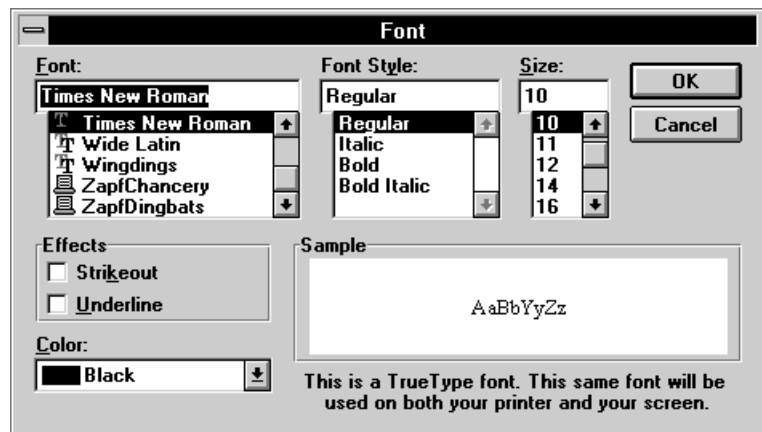


Figure 4-8. The Font dialog

7. We want to set the report title to a larger, bolder version of the active font, so click Bold in the Font Style box and 18 (or a point size suitable to the font you are using) in the Size scroll box to make your selection.

Notice that the Sample box in the Font dialog box shows you an example of how the text will look. Click OK when finished. Your report title resizes to the new font size.

8. To center the Title, we're going to use a Crystal Reports' alignment tool. But first we'll need to expand the title field box so it's about the same width as the data in your report. To do this, position your cursor on the right edge of the Report title field box until you get a double-arrow resizing cursor. Drag the right edge of the field box until it is even with the right edge of the data in the GROSS column in the Preview Window. You may need to release the field box, scroll the window to the right, then continue expanding the field box until it is even with the right edge of the GROSS column.



9. Scroll to the left edge of the Preview Window when finished. What you have done now is created a large field that extends from the left edge to the right edge of your report. Now we're going to center align the title in that field so it will automatically be centered above your report data.
10. At the bottom of the window is the Format bar. Click the Center alignment button to center the report title inside the text field.

Response: Your report title is centered within the Report Title field.

Object Linking and Embedding (OLE)

Now that we have a report title, we'll place a logo underneath it. The logo exists as a bitmap file that was created in Microsoft Paintbrush, an application that came with your Windows system. We could insert the bitmap into our report using the Insert Graphic button, but we want to be able to edit the graphic and make changes after it is already in our report. To be able to do this, we'll insert the graphic as an OLE object.

Object Linking and Embedding (OLE) is a unique feature that allows you to add data or images to your report that have been created by an application other than Crystal Reports, then be able to modify the data from within your report. For example, you may use a program to prepare a document with data relevant to a report you created in Crystal Reports. You can include the document in the report by inserting it as an OLE object.

If the data in the document changes, it can be opened from Crystal Reports. Crystal Reports will open the application that created the object (the document) and let you make any necessary changes. Once finished, the document displayed in your report can be automatically updated before you return to Crystal Reports.

Inserting an OLE object

We're going to add a logo below the report title in our report. First we need to make room in the PH (Page Header) section for the logo. Click on the Design tab to switch to the Design window.

- | Step | Action |
|------|--|
| 1. | In the Design window, move the mouse cursor inside the PH (Page Header) section, just above the row of field titles and just below the report title field box. When the cursor changes to an I-beam, click once.

Response: The insertion cursor appears next to the left margin of the report. |
| 2. | Press the ENTER key on your keyboard four times. |

Response: Four new blank lines open up between the report title and the row of field titles.

3. Click the Preview tab in the upper left hand corner of the Design window to see how the report looks now.
4. Select the **Insert/Object** command.

Response: The Insert Object dialog box appears.

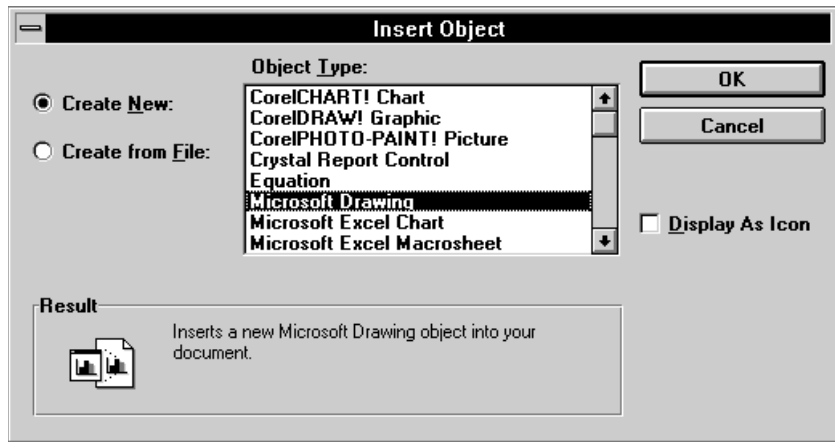


Figure 4-9. The Insert Object dialog


5. The logo already exists on your hard disk as a bitmap file, so we want to create an OLE object from this file. Click the Create from File option in the dialog box.

Response: In the File text box that appears, Crystal Reports displays the path and directory it has been installed in, for example c:\crw\.

Action: Move the mouse cursor into the File text box, just after the second backslash, until the I-beam cursor appears. Click to place the insertion cursor at the end of the path statement.

6. Type in the name of the bitmap file, camera.bmp. The final path statement in the File text box should read c:\crw\camera.bmp. Click OK.

Response: The Insert Object dialog box disappears, and a large box appears underneath the mouse cursor.

 *The file camera.bmp is a 16 color bitmap created in Microsoft Paintbrush. A second file, camerab.bmp, was created as a gray-scale image and will print to a printer clearer than the color image. If you prefer, use camerab.bmp in the above step instead of camera.bmp.*

The large box represents the graphic logo you will place. When it is attached to the mouse cursor, the box is called the placement rectangle.

7. Position the rectangle right underneath the report title so that it is centered with the title. Click the mouse to place the object.

Response: The logo appears below the title.

8. The logo looks good as it is, but the advantage of OLE is that we can edit the object after it has been placed in our report. We don't need to change the logo, but it will be helpful to learn how to open the OLE object so that it can be edited.

Editing an OLE object

Follow the procedure below to edit an OLE object in a report.

Step

Action

1. Open the Edit menu and select Paintbrush Picture Object. The exact wording of this command varies according to the type of OLE object you have selected and is commonly referred to as simply Edit|Object.

Response: A submenu appears to the right of the command when it is selected.

2. Choose Edit from the submenu. Since the logo is a bitmap graphic file created in Microsoft Paintbrush, Paintbrush opens displaying the logo image.

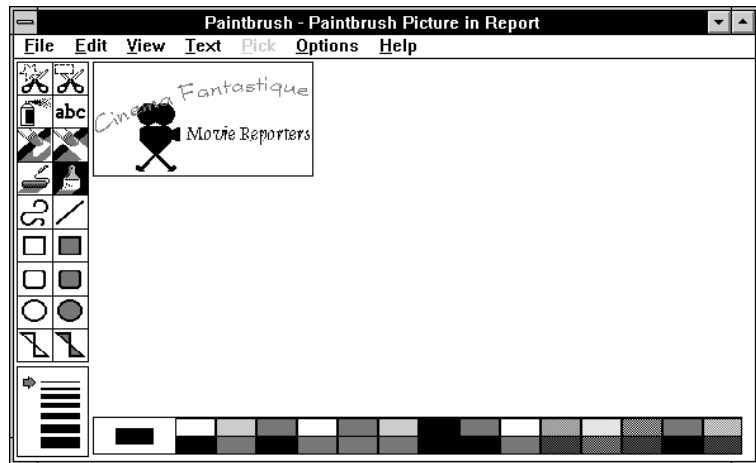


Figure 4-10. Editing a logo in Paint Brush

3. At this point, we could use the tools and commands available in Paintbrush to make changes to our logo. By choosing the Update command from the Paintbrush File menu, we can update the image in our report to match the changes we make on the image in Paintbrush.
4. We don't really need to make any changes right now, so choose the Exit & Return to Report command from the Paintbrush File menu.

Response: Microsoft Paintbrush closes and you return to the Preview Window.

If you would like to learn more about OLE, search for OLE in Crystal Reports Help. If you would like to learn more about the Microsoft Paintbrush application, please refer to the documentation that came with Microsoft Windows.

Editing text fields

Follow the procedure below to edit text fields in your report.

Step

Action

1. Right now the column headings in your report are a bit cryptic. We want to change the headings to make them clearer.
2. In the Preview Window, click the *MOVIE* column heading, and, with the cursor positioned inside the heading field box, click the right mouse button.

Response: A pop-up menu appears next to the field heading.

3. Select Edit Text Field from the pop-up menu.

Response: The Edit Text Field dialog box appears. The current heading is displayed in the white Enter Text box.

4. Delete this heading and enter the new heading *Film Title*: click Accept when finished.

Response: The heading is changed in the Preview Window.

5. Repeat Steps 2 and 3 to make the following changes:

- Change YEAR to *Made*:
- Change COUNTRY to *Studio Location*:
- Change GROSS to *Gross Earnings*:

6. There's nothing special about the titles to make them stand out from the field values, so we'll change their color. First we'll select all the headings and then we'll make the changes at one time. Use the SHIFT-CLICK combination to select all of the column headings.

7. When all of the headings are selected (and with the cursor positioned inside one of the heading field boxes), click the right mouse button and select Change Font from the pop-up menu that appears.

Response: This takes you to the Font dialog box.

8. In the Font dialog box, select Navy as the font color from the Color drop-down list box. Click OK when finished.

Response: The selected fields in the Preview Window all turn Navy.

9. As you can see, the Preview Window is just as powerful as the Design window, plus, you work with real data while you make changes to the report. You will often find yourself “fine-tuning” your report in the Preview Window to maximize the report's impact. For the next step, though, we'll return to the Design window. Click the Design tab to return to the Design window.

Sorting and summarizing your report

Reports can be grouped and sorted in a variety of ways, for example:

- A movie list can be sorted alphabetically by movie title or chronologically by year of release.
- Sorting can be based on values in a single field, or the values in several fields.
- The report can display values in ascending order (A to Z, 1 to 9) or descending order (Z to A, 9 to 1).
- Sorted data can be grouped and summarized.


Sorting and summarizing tools provide you with a great deal of flexibility for customizing your reports.

In this section, you'll learn how to sort and group report data by adding a summary field, and how to print a hard copy of your report.

Adding a summary field

In many reports you need to break your data into groups to make it easier to read and to understand. Crystal Reports lets you do this easily. But some times, you want to do more than group the data. You want to summarize the values in each group (total them, count them, etc.). For example, in a Movie list report, you may want to break the data into groups by Studio and then calculate the total earnings for each studio. You do that using a summary field.

With Crystal Reports, we can break our data into groups and add a summary field all in one step. For our movie list, we'll create a summary field that groups the movies by studio and then totals the earnings for each group.

 *When you first put fields on a report, the program looks at the first field you added and it presents your data in the same order as the values in that field are stored in the originating database.*

1. We want the movie list:
 - Sorted by Studio, and
 - Broken into Studio groups.
2. Then we want the program:
 - To total the earnings for each Studio group, and
 - To display the total below each group.
 - This sounds like we're asking for a lot, but Crystal Reports makes it easy.
3. Since we're interested in the total blockbuster earnings for each studio, we'll summarize the *movie.GROSS* field and ask the program to print a summary whenever the value in the Studio field changes. Here's how the program will process this request:
 - It will sort the movie records based on the value in the Studio field,
 - Going down the list, it will start a new group every time it comes to a new studio, finally,
 - It will total the earnings in the Gross field for each group before it starts a new group.

Now that you understand the theory, let's make it happen.

Step**Action**

1. First, close the Insert Database Field dialog box by clicking the Done button at the bottom of the dialog box. That way it is not in our way for the next step.
2. Select the *GROSS* field by clicking its field box in the D(etails) section of the Design window, and then click the Insert Summary button.

Response: The Insert Summary dialog box appears.

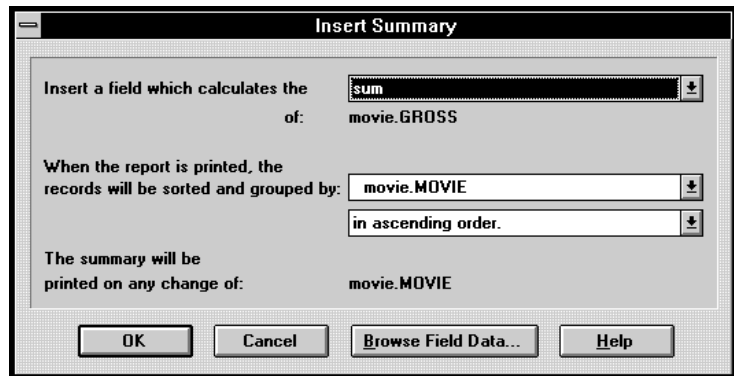


Figure 4-11. The Insert Summary dialog

3. We want a summary operation which totals the earnings for each studio group. Click the down arrow button attached to the right side of the drop-down list box at the top of the dialog box. Select *sum* from the list that appears. This option totals the field values in a list.
4. Notice that the field *movie.GROSS* is named just below this drop-down list box. This means we are going to total gross earnings.
5. The second drop-down list box asks which field will be used to sort and group the report. We want to sort and group our report by Studio, so click the down arrow button attached to this list box and select *studio.STUDIO* from the list that appears. We'll leave the sort order as Ascending because we want the list to appear in alphabetical order by Studio.

6. Click OK when finished and Crystal Reports groups and summarizes your report by *Studio*.

Response: Your report should look like this:



Figure 4-12. Sample Movie report

7. Scroll to the left side of the Design window if it is not already visible on the screen.

Notice that two new sections now appear in the Design window: GH1 (Group Header) and GF1 (Group Footer). This is how Crystal Reports shows that the report has been grouped. The new summary field appears in the GF1 section, just under the GROSS field.

8. Click outside of the field boxes to deselect the new summary field. Click the Preview tab to print the report to the Preview Window.


Note that the report is sorted based on the studio that made the movie, and each group contains only the movies from a single studio group. Note too that the total blockbuster earnings appear after each group, just below the *GROSS* field.

Highlighting the summary field

Follow the procedure below to highlight the summary field in your report.

Step

Action

1. Your report is starting to look professional, but let's make that summary field stand out more and give it a label. Select one of the summary values in the Preview Window.
2. When the values are selected, (and with the cursor positioned inside one of the selected fields), click the right mouse button and select Change Font from the pop-up menu that appears. This takes you to the Font dialog box. Change the font color to Navy, using the same procedure as you did for the field headings. Click OK when finished. The summary fields in the Preview Window all turn Navy.
3. Click the Design tab to return to the Design window. Now we'll add a label to the summary field.
4.  Click the Insert Text Field button on the Button bar, type in "**Earnings:**" in the Edit Text Field dialog box, and click Accept when finished. The dialog box disappears, and a field placement box appears under the mouse cursor.
5. Position the empty field box to the left of the summary field, (Sum of GROSS), in the GF1 section of the Design window and click the left mouse button to place it.

Response: The new text field label appears in your report.



6. With the new label still selected, use the Format bar to change the text field's attributes. Click the Bold button on the Format bar, and click the Italic button.

7. Deselect the text field when finished, and click the Preview tab to change to the Preview Window.

Response: Your data should look similar to this:

Crystal Reports Pro - [c:\crw\movies.rpt]

File Edit Insert Format Database Report Window Help

Design | Preview Today 13:37 Close 1 of 2 Cancel

Movie Reporters

Film Title	Made	Studio Location	Gross Earnings
Star Wars	1977	U.S.A.	322,000,000.00
Hombre Alone	1990	U.S.A.	283,014,000.00
Batman	1989	U.S.A.	251,188,924.00
Hombre Alone 2	1992	U.S.A.	172,667,430.00
The Sound of Music	1963	U.S.A.	171,000,000.00
		Earnings:	201,872,374.00
Ghostbusters	1984	U.S.A.	220,833,496.00
		Earnings:	220,833,496.00
Looleo	1992	France	410,488.00
		Earnings:	410,488.00
Return of the Jedi	1983	U.S.A.	243,794,442.00
Raiders of the Lost Ark	1981	U.S.A.	242,373,434.00
The Empire Strikes Back	1980	U.S.A.	223,000,000.00
Indiana Jones and the Last Crusade	1989	U.S.A.	179,870,270.00
Indiana Jones and the Temple of Doom	1984	U.S.A.	179,870,271.00
		Earnings:	1,088,830,437.00

Records: 43 100 %

Figure 4-13. Sample Movie report

Adding a “Live” group header

To finish up our customer list, we'll add a group header to highlight each group. While we could make it so each group has the same header, it will make for a better report if the header describes the values in each group. Since we've grouped the report by Studio, we'll have the group header display the studio name for each Studio group.

As we saw earlier, whenever you group data, Crystal Reports creates a group footer section and a group header section. The sum (summary field) appears in the group footer section. By placing the *STUDIO* field in the group header section, the report will Preview Window the appropriate studio name before each Studio group. This is called a “Live” header, a header that changes based on the value of a field, in this case *studio.Studio*.

Step**Action**

1. Click the Design tab to switch to the Design window. Click the Insert Database Field button to open the Insert Database Field dialog box.
2. Select the Studio field and drag it into the Design window.
3. Position the field in the GH1 section just above the *MOVIE* field.
4. Release the mouse button to place the field.
5. Close the Insert Database Field dialog box by clicking Done
6. Use the Format bar to change the group heading to 16 point bold, italic, underlined.
7. Deselect the field, and select the Preview tab to print the report to the Preview Window.

Response: It should look similar to the following:

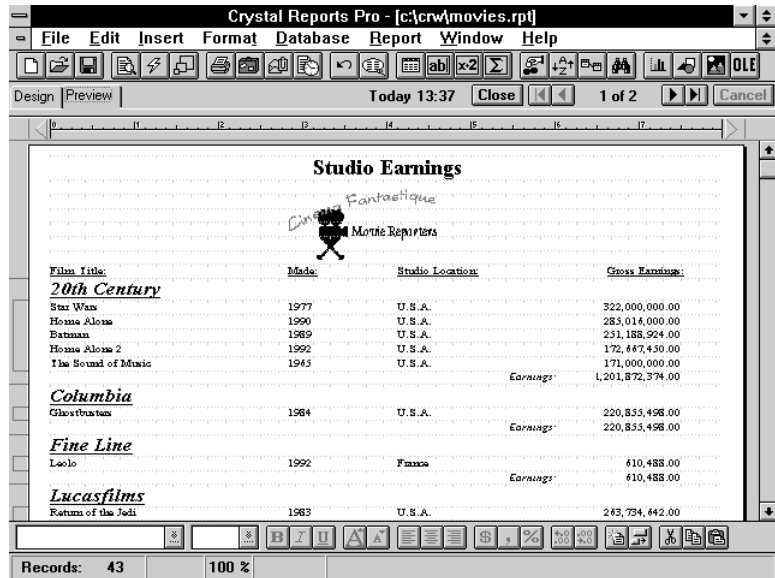


Figure 4-14. Design Window

Note how the heading appears above each group section with a studio name for each individual group. This is a “Live” header.

Congratulations! You've just completed your first report with Crystal Reports. It's a pretty impressive report, and Crystal Reports made it easy to do.

Printing a hard copy

Follow the procedure below to print a hard copy of your report.

Step

Action

1. Save your report by clicking on the Save button, or by selecting **File/Save**.
2. If you want to print a hard copy of your report, click the Printer button on the Button bar.

Response: The Print dialog box appears.

3. Select the pages you want to print, the number of copies you want, and toggle the Collate Copies box *on* if you want your copies collated.

Response: When you click OK, the program prints your report.

 *If you don't have a Postscript printer, you won't be able to print this report to a printer using the Postscript printer driver.*

Rearranging Data into a Data Block Format

Crystal Reports provides you with incredible control over your data. In this section, we take the data that you used for one report and totally rearrange it into a data block format. You'll learn how to:

- Insert blank lines,
- Move fields into new positions,
- Delete unneeded fields and sections, and
- Create a formula using the Formula Editor.

By the end of this section, you'll start to understand Crystal Reports' amazing flexibility.

Deleting the Group section

We're going to create a different report now, using the same database fields currently in our movie list. This time we'll put the movie data into a data block format. We won't need the group headings and summary anymore, though, so we'll delete the entire group section.

Step

Action

1. Switch to the Design window by clicking on the Design tab. Move your cursor into the gray area at the left of the Design window.
2. Position the cursor over the GH1 or GF1 section. If you have trouble finding the group section with your cursor, move the cursor up and down in the gray area and watch the right side of the Status bar.

Response: The Status bar will read “Group header #1” or “Group footer #1” when you are in the right area.

3. Click the right mouse button, and select Delete Section from the pop-up menu.

Response: A dialog box appears asking you to make sure you want to delete this section. Click Yes. Both the Group Header and the Group Footer are deleted along with the fields in these sections. The Design window should look like the following:

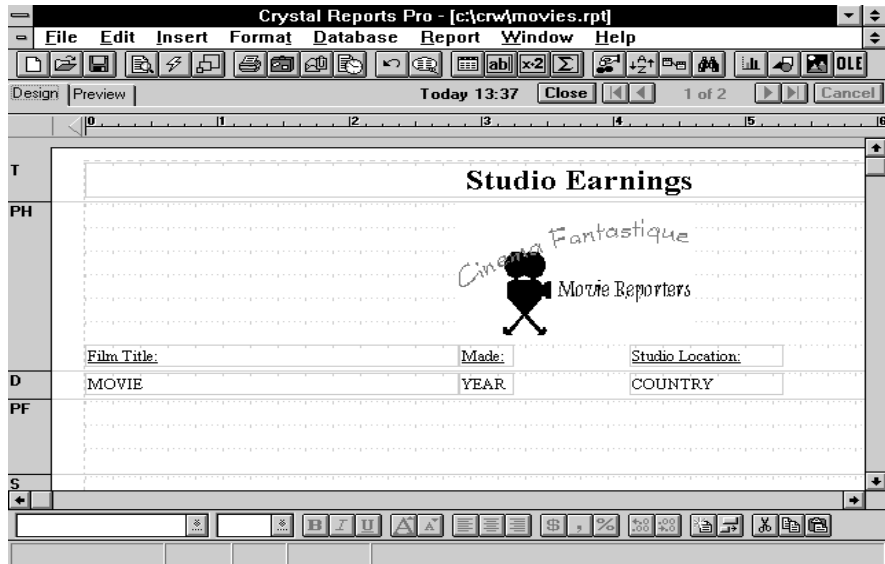


Figure 4-15. Sample Design window

Inserting blank lines

Follow the procedure below to insert blank lines in your document.

Step

Action

1. Move the mouse cursor into the gray area to the left of the D(etails) section. Click the right mouse button and select Add Line from the pop-up menu that appears. A blank line opens up at the bottom of the D(etails) section. This gives us more room to rearrange the fields into our new format.

2. Repeat the last step one more time to open up one more line in the D(etails) section. We will move our fields into these lines in the next section of the tutorial. You can also insert blank lines into the Design window by moving the mouse cursor over the line separating two sections of your report (D and PF for example). When the section resizing cursor appears (two arrows with a line between), press the left mouse button and drag the line up or down to expand or decrease the amount of space allotted to a section.

Moving fields to new positions

In our new report, we want the movie title to appear first, and the year of the movie to appear on the same line as the movie title. We want the gross to appear last.

Step	Action
1.	Select the <i>GROSS</i> field in the Details section. When the handles appear, drag the field down to the bottom line in the Details section, and then all the way over to the left margin using your mouse.

2. Select the *COUNTRY* field in the Details section. When the handles appear, drag the field to the second line of the Details section and then over to the left margin using your mouse. Your report should look similar to the following:

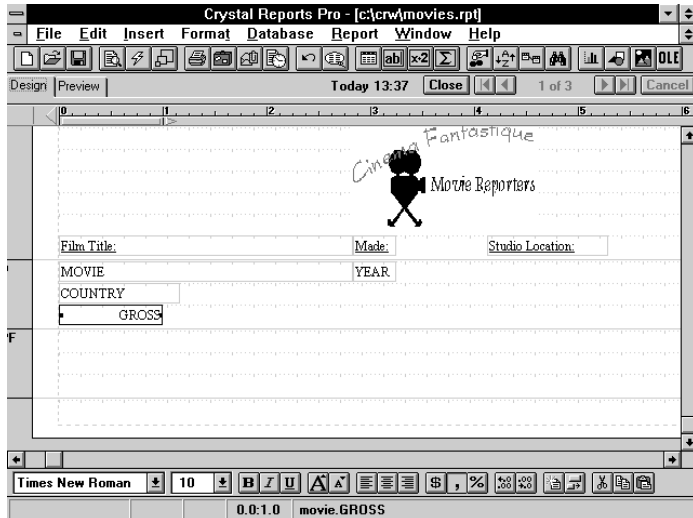


Figure 4-16. Design Window

3. Select the Movie field and the Year field and delete them from the Details section. We don't need them any longer because we are going to create a formula that will replace these fields.

Creating a formula

We want the Movie title and the Year of the movie to appear as you might print them, in the format *Movie, Year*. We can do this by creating a formula that adds these fields together into the format we want.

Step

Action



1. Click the Insert Formula Field button on the Button bar or, select **Insert/Formula Field**.

Response: The Insert Formula dialog box appears.

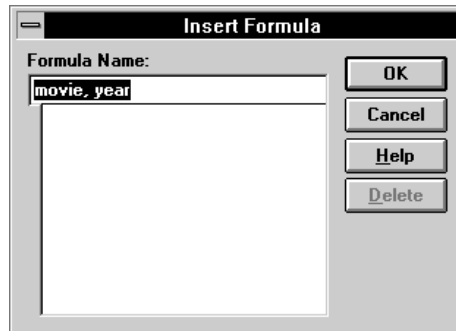


Figure 4-17. Insert Formula dialog

2. Type in “movie, year” in the Formula name text box as the name of your new formula. Click OK.

Response: The Insert Formula dialog box disappears, and the Edit Formula dialog box (Formula Editor) appears. The name of your formula appears in the title bar of the dialog box preceded by an @ symbol. Crystal Reports uses the @ symbol to identify formula fields.

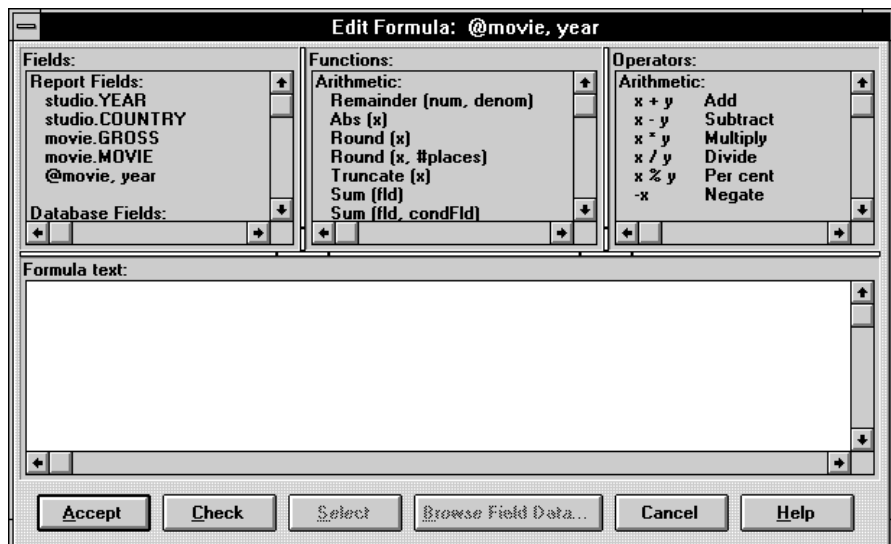


Figure 4-18. Edit Formula dialog

3. In the Functions scroll box in the center of the top section of the Formula Editor, scroll down through the functions until you find the Trim-Right(x) function.

Response: It appears under the Strings heading in the scroll box.

 *To learn more about the TrimRight(x) function, search for Trim-Right function in Crystal Reports Help. To learn more about functions, search for Functions in Crystal Reports Help.*

4. Click the TrimRight(x) function in the Functions box, and click the Select button at the bottom of the Formula Editor.

Response: The function appears in the Formula text box. You have just added this function to your formula. The function needs an argument though, a field or value to perform an operation on. To help you place one, Crystal Reports already put the insertion cursor where the argument should appear: between the parentheses.

5. In the Fields scroll box at the top left corner of the Formula Editor, double-click the *studio.MOVIE* field.

Response: "{studio.Movie}" appears in the Formula text box between the parentheses of the TrimRight() function. You may find double-clicking to be a faster method of inserting fields, functions, and operators in your formulas.

So far, your formula should read `TrimRight({studio.Movie})`. The TrimRight() function trims any trailing white space off of the right side of the field. This means the *studio.Movie* field values will print in your report without any excess white space to the right of them. Anything that is printed next to the field will appear right next to the values stored in the field, regardless of the length of any of the values.

6. Now, we need to add a comma after the *MOVIE* field and add the next field to our formula. Move the mouse cursor into the Formula text box until it becomes an I-beam cursor. Click the I-beam directly after the final parentheses of the TrimRight() function to place the insertion cursor there.
7. Type in the following directly after the parentheses:
+ “,” +

Be sure to put a space directly after the comma inside the quotation marks. Don't worry about putting spaces before or after the + signs, Crystal Reports ignores them if they are there.

8. Now double-click the *studio.YEAR* field in the Fields scroll box to add it to your formula. "{studio.YEAR}" appears in the Formula text box.

The finished formula should look like this:

```
TrimRight({studio.MOVIE}) + "," + {studio.YEAR}
```

This formula first trims off any trailing white space from the value in the *MOVIE* field, then prints the *MOVIE* field value with a comma and a space directly after it. The space is followed by the value in the *YEAR* field. The result is a nice format of "movie, year".

9. Click the Check button at the bottom of the Formula Editor.

Response: Crystal Reports automatically checks to see if there are any errors in your formula. If you've done everything correctly, the program displays a message box that confirms that no errors were found in your formula.

Action: Click the OK button in the dialog box to close it.



If you get an error, double check to make certain you've entered the formula correctly, then try again.

10. Click the Accept button at the bottom of the Formula Editor to accept your formula as it appears.

Response: The Formula Editor closes, and a field placement box appears attached to the mouse cursor.

11. Place the field placement box in the Design window in the empty line above the GROSS and COUNTRY fields.

Response: A field box appears in your report representing the @Movie, Year formula and a new field title appears in the PH (Page Header) section. Your report should look similar to:

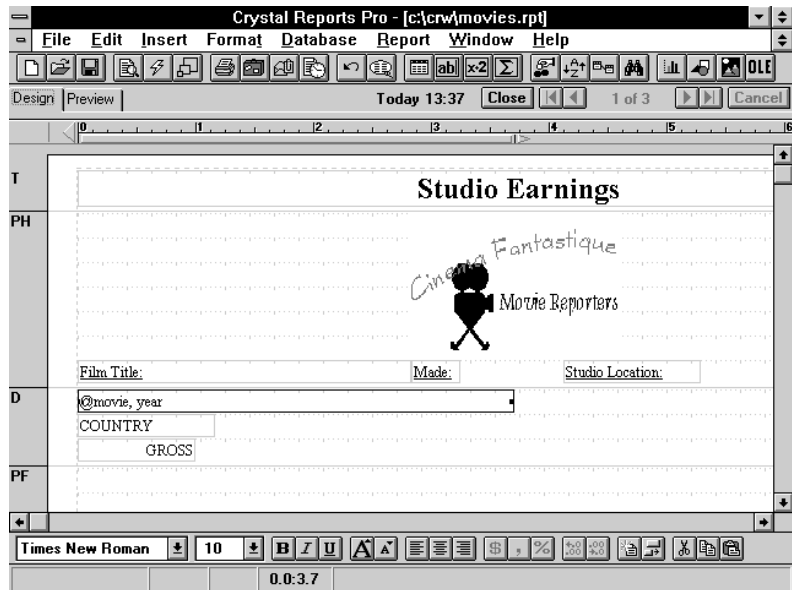


Figure 4-19. Sample Completed Movie Report

Congratulations, you've just added a formula to your report. Formulas are just one of the many features that make Crystal Reports so powerful.

Deleting the remaining fields and field titles

Follow the procedure below to delete remaining fields and field titles from your report.

Step

Action

1. We don't need the *movie, year* field title that came with the formula field we just inserted. It is in the Page Header section, on top of the *film title* field. Select the *movie, year* field title in the Page Header section. Handles appear on the field.
2. Press the Delete key on your keyboard to delete the field.

Response: The *movie*, *year* field title is deleted, and the *film title* field remains in the Page Header section.

3. Using the SHIFT-CLICK combination, select the *Movie*, *Year Made*, *Studio Location* and *Gross Earnings* field titles in the Page Header section of your report. Handles appear on all fields.
4. Press the DELETE key on your keyboard.

Response: All four fields are deleted.

5. Print the report to the Preview Window to see how your data blocks look.

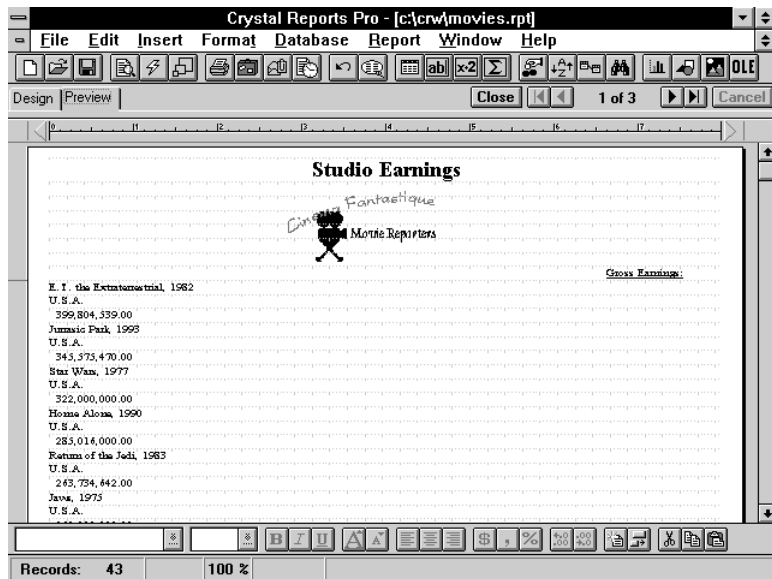


Figure 4-20. Preview window

Adding a line between records

Follow the procedure below to add a line between records in your report.

Step

Action

1. One thing is clear: you need a blank line between movie records. To add the blank line, move the mouse cursor into the gray area just to the left of the column of data in the Preview Window. Make sure the mouse cursor is in the D(etails) section of the gray area. If you have trouble locating the D(etails) section here, move the mouse cursor up and down in the gray area, and watch the Status bar until it reads Details.
2. Click the right mouse button, and a pop-up menu appears.
3. Select Add Line from the pop-up menu.

Response: A blank line opens up just below each of the values from the GROSS field.

Congratulations! You've totally rearranged the data into a brand new report.

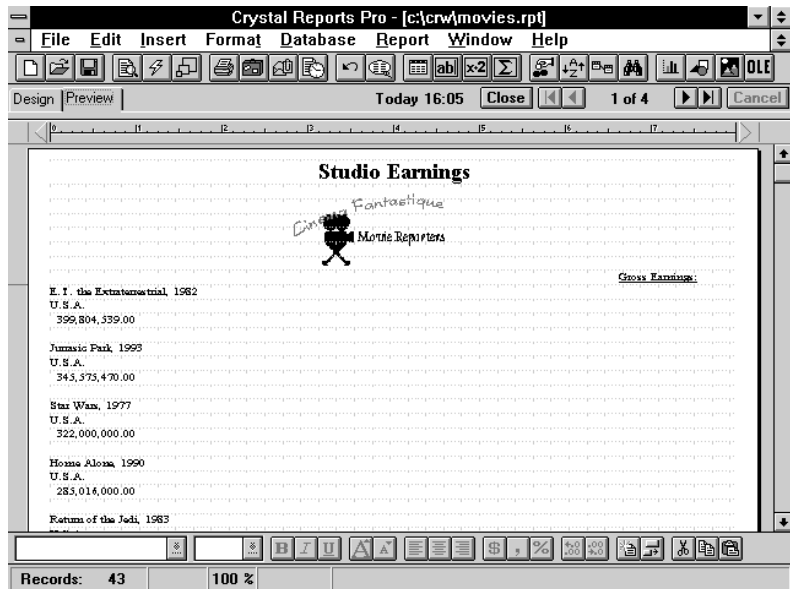


Figure 4-21. New report with previous data

A first look at selecting records

Record selection limits or restricts the records that are to be included in a report. For example, if you want to run a report including only Columbia Studios movies, you can do this by selecting only Columbia records for your report. In this section you'll learn how to:

- Select the records you want included in your report, and
- Save a report including your selection criteria.

We'll begin by entering the selection condition.

Splitting the list via Select Records

We've decided that it would be helpful for the box office to have a movie list that only lists movies from Paramount and Universal Studios. Crystal Reports makes it easy to restrict lists like this using the Select Records command. Follow the procedure below to split the data list by selecting records in your report.

To begin, switch to the Design window. Since our list is going to be based on whether or not the movie is from Paramount or Universal studios, we'll base our record selection on the *movie.STUDIO* field, and we'll include only those records that are for Paramount and Universal movies.

Hiding the STUDIO field

Follow the procedure below to hide the STUDIO field from your report.

Step	Action
1.	We need to use the <i>STUDIO</i> field to set up a record selection formula but it doesn't currently exist in our report. Open the Insert Database Field dialog box by clicking the Insert Database Field button.

2. Insert the *STUDIO* field in the Details section of your report. It does not matter where you place the field in the Details section, because we are going to hide the field. We don't want the values in that field to appear in the report.
3. Click Done in the Insert Database Field dialog box to close the dialog box.
4. Position the cursor inside the *STUDIO* field, and click the right mouse button once.

Response: A pop up menu appears.

5. Select Change Format from the pop-up menu.

Response: The Format String dialog box appears.

We'll use this dialog box to change the format of the *STUDIO* field. If the value in this field was a number, the Format Number dialog box would have appeared. The dialog box that appears here is specific to the type of data stored in the field selected.

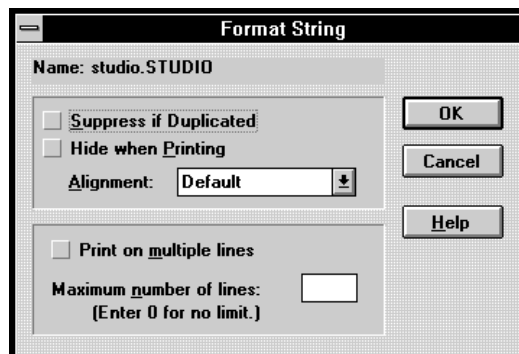


Figure 4-22. Format String dialog

6. Click the Hide when Printing checkbox in the dialog box.

Response: This will hide the *STUDIO* field when the report is printed so that the field values will not appear in the print-out.

7. Click the OK button, and the Format String dialog box disappears.

Notice that the field name in the *STUDIO* field box is grayed out in the Design window. This means that the field is hidden. Even though it's hidden, we can still select the field and use it to base our record selection on.

8. Select the *STUDIO* title in the Page Header section.

Response: Handles appear on the field.

9. Press the Delete key on your keyboard to delete the field, since we don't want it to appear in our report.

We only need the hidden field to perform our selection.

Entering your selection criteria

Follow the procedure below to enter your selection criteria.

1. With the cursor inside the *studio.STUDIO* field again, click the right mouse button and choose Select Records Expert from the pop-up menu.

Response: The Select Records Expert dialog box appears.



Figure 4-23. Select Records Expert dialog

Action: Our job in this dialog box is to imagine that we are completing the sentence:

Select all records where studio.STUDIO is

Action: You complete the sentence with the condition you want the program to use when selecting records for your report. Since we want to create a list that includes only movies from Paramount and Universal Studios, our condition for the list is that the value in the *studio.STUDIO* field must be one of Paramount or Universal. Right now the condition is any value, clearly not a restrictive condition. Click the arrow on the right drop-down list box to see what other options you have.

2. Since you want only those records where the *studio.STUDIO* is one of Paramount or Universal, select the *one of* condition. When you select it, *one* appears in the original list box and a new edit box appears beside it on the right. The dialog box sentence would now read:
Select all records where studio.STUDIO is one of

All that you need to complete the sentence are the values Paramount and Universal. We'll take a quick look at a tool the program includes for looking at those values. Click the Browse button and a browse and paste dialog box appears.

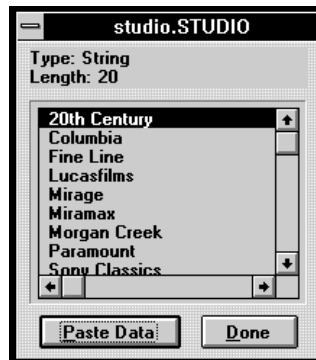


Figure 4-24. Browse and paste dialog

The title of the dialog box identifies the field you're looking at, *studio.STUDIO*. Just below the title, the dialog box displays the data type of the field (String) and the field length in characters (20).

3. The scroll box contains a list of actual field values. Paramount appears on the list and we know that's one of the values we want to use to complete the sentence. Let's paste that value into the new edit box so we don't have to worry about typing it in. Click the Paramount listing to highlight it and click Paste Data.

Response: The dialog box disappears and Paramount now appears below the new edit box.



Figure 4-25. Select Records Expert dialog

4. Repeat steps 3 and 4 above to paste Universal to the edit box.

Response: Our sentence could now read:

**select all records where studio.STUDIO is one of
Paramount or Universal.**

5. Click OK to return to the Design window. Deselect the *STUDIO* field by clicking anywhere outside the field box. Click the Print Preview button so you can review the results of your work. Scroll down through the report. Now, only movies by Paramount and Universal studios appear in your report.

6. Click on the report title, then click the right mouse button. You may have to scroll to get to the report title. Select Edit Text Field from the pop-up menu, and Crystal Reports opens the Edit Text Field dialog box with the report title displayed in the Enter Text box. Position the insertion cursor after the final “s”, press the space bar once and then type: **(Paramount and Universal Studios)**

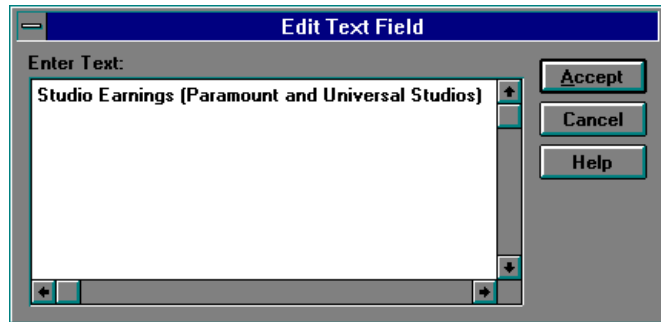


Figure 4-26. Edit Text Field dialog

7. Press Accept to close the dialog box when you're finished.
8. Save this version of the report without erasing the old report in the process by using the **File/Save As** command and giving the new report the name STUDIO.RPT.

Congratulations! You've completely rearranged your report and added selection criteria to it. More than that, you've really learned how to manipulate your database data. By now, you have a good idea of the powerful kinds of reports you can prepare with Crystal Reports. As you can see, it's an easy program to use.Xs

Creating formulas in Crystal Reports is much like creating formulas with your favorite spreadsheet; the primary difference is that Crystal Reports formulas often reference fields instead of spreadsheet cells. Otherwise we think you'll find many similarities. This chapter leads you through the following formula creation topics:


- Inserting text, variables and fields in formulas.
- Inserting operators and functions in formulas.
- Inserting other formulas in formulas.
- Inserting group field values in formulas.
- Including comments with formulas.
- Deleting formulas from your report.
- Copying formulas from Crystal Reports Help.
- If-then-else formulas.
- Multi-condition if-then-else formulas.
- Concatenated text strings with formulas.
- Formatting text with formulas.
- Stacking formulas and fields.
- Order of precedence in formulas.
- Formula evaluation time considerations.
- Copying formulas from one report to another.

To view a variety of sample formulas, please refer to the *Formulas in action* topic in Crystal Reports Help. Each sample formula demonstrates the use of multiple functions and operators working together to solve real-world problems, and each formula is discussed in depth. (For detailed descriptions of the individual operators and functions, see the Reference section of the Crystal Reports Help Contents.)

Inserting Text and Numbers in Formulas

You insert text and numbers in formulas by typing them into the formula text box.

- Text must be surrounded by 'single' or “double” quotation marks.
- Numbers must be entered without commas (1000000 not 1,000,000).
- You can use the Cut, Copy, and Paste commands with text in the Formula Editor.

 *Formulas are treated as text by Crystal Reports. The program uses syntax items (quotation marks, brackets, parentheses, etc.) to identify the various formula components.*

Inserting Fields in Formulas

You can enter fields into your formulas in two ways: via the Fields box in the Formula Editor, or manually.

Inserting fields using the Fields scroll box

To enter a field via the Fields scroll box, you move the I-beam cursor to the place you want to insert the field and click the left mouse button to set the insertion point there. Then you locate the field you wish to insert from the Fields scroll box list.

- Fields already in use in the report are grouped at the top of the list; other available fields follow.
- Formulas you have entered are listed next, their names preceded by the @ sign.
- Groups you have entered are listed next.
 - Groups that you enter in group sections appear in the following format:

```
group section:sort and group by field:  
summary action/field summarized
```

- Groups that you enter in the Grand Total section appear in the following format:


```
Grand total:  
summary action/field summarized
```
- All other fields available in the active databases are listed last, grouped by database.

Notes to consider

- In the Edit Formula dialog box the Fields, Functions and Operators boxes can be resized to make viewing their contents easier.
- For large Btrieve.ddf files (.ddf files that contain four or more database files), Crystal Reports displays the names of the files in the .ddf file, not the individual field names. To review the field names in individual files:
- Select the file of interest from the scroll box in the Fields box. The Formula Editor Select button changes to an Open button.
- Click the Open button and the program lists all of the fields in the selected database file immediately after the file name.
- Select the field(s) of interest as you would from any other kind of database (.dbf, .db, etc.).
- Click the name of the open file and Click the Close button if you want to hide all of the field names once again.

For additional information, search for Btrieve files in Crystal Reports Help. You select an item from the Fields scroll box by double clicking it, or by clicking it once to highlight it and then clicking the Select button at the bottom of the Editor to complete the selection process.

Inserting fields manually

To enter a field manually, you locate the insertion point in the appropriate position and type in the field name as you would any text.

- The correct syntax for a database field name is:
`{file.fieldname}`
- The correct syntax for a formula field is:
`{@formula name}`
- If you don't include the file name, leave out the separating colon, or fail to surround the expression in braces, Crystal Reports will generate a Formula Compiler Warning detailing your error.

Pasting field values into your formula

Crystal Reports also enables you to paste actual values from selected fields directly into your formulas. This can be useful, for example, in cases such as these:

```
{file.STATE} = "WY"
```

or

```
{file.ZIP} > "52323" and {file.ZIP} < "54575"
```

Instead of having to remember the specific data you want to use to compose your condition ("WY", "52323", "54575"), you can browse through the first 20 values for a selected field and paste the value(s) of interest directly into your formula.

Follow the procedure below to paste field values directly into your formula.

Step

Action

1. In the Fields scroll box in the Formula Editor, highlight the field that holds the values you want to include in your formula.
2. Click the Browse Field Data button at the bottom of the Formula Editor.

Response: A dialog box appears with a scroll list of values for the selected field.

3. Highlight the value of interest and click the Paste Data button or double-click the value of interest.

Response: Crystal Reports pastes the value selected at the insertion point in your formula.


Inserting Operators in Formulas

You can enter operators into your formula in one of two ways: via the Operators scroll box in the Formula Editor, or manually.

Using the Operators scroll box

To enter an operator via the list in the Operators scroll box, you set the insertion point where you want the entry to appear in the formula.

Then you select the operator of interest from the scroll box list. Crystal Reports inserts the selected operator in your formula, complete with any parentheses, brackets, or commas required.

 *For an array of items, only the first comma is included. As you enter additional items into an array, you will need to type in commas to separate the items.*

Inserting operators manually

To enter an operator manually, you locate the insertion point in the appropriate position and type in the operator as you would any text.


Inserting Functions in Formulas

You can enter functions into your formula in one of two ways: via the Functions scroll box in the Formula Editor, or manually.

Using the Functions scroll box

To enter a function via the list in the Functions scroll box, you set the insertion point where you want the entry to appear in the formula.

Then you select the function of interest from the scroll box list. Crystal Reports inserts the selected function in your formula, complete with any parentheses, brackets, or commas required.

 *For an array of items, only the first comma is included. As you enter additional items into an array, you will need to type in commas to separate the items.*

Inserting functions manually

To enter a function manually, you locate the insertion point in the appropriate position and type in the function as you would any text.

Inserting Other Formulas in Formulas

Just as you can enter database fields in formulas, you can enter other formulas in formulas too. Crystal Reports performs the calculations in the referenced formula, and then it uses the value returned by the referenced formula in the same way it uses any other value. For example, the formula:

$$1 * (2 + 4 * 6 / 3 - 7 * 12 - 8) + 2 * (2 + 4 * 6 / 3 - 7 * 12 - 8) + 3 * (2 + 4 * 6 / 3 - 7 * 12 - 8) + 4 * (2 + 4 * 6 / 3 - 7 * 12 - 8) = -820$$

includes the expression $(2 + 4 * 6 / 3 - 7 * 12 - 8)$ repeated many times.

If you had created a formula for the repeated expression ($@F = (2 + 4 * 6 / 3 - 7 * 12 - 8)$) and then referenced that formula instead of entering the expression itself, you would get the same result.

$$1 * \{ @F \} + 2 * \{ @F \} + 3 * \{ @F \} + 4 * \{ @F \} = -820$$

Every time Crystal Reports sees the formula $@F$, it performs the $@F$ calculations and returns the value -82, just as the expression underlying the formula $(2 + 4 * 6 / 3 - 7 * 12 - 8)$ returns the value -82.

Inserting other formulas from the Fields box

To enter a formula via the list in the Fields scroll box, set the insertion point where you want the entry to appear in the formula.

Select the formula of interest from the scroll box list (formulas appear in the list with $@$ signs preceding their names). Crystal Reports inserts the selected formula in your formula, complete with the required braces.

Inserting other formulas manually


To enter a formula manually in a formula, set the insertion point where you want the entry to appear. Type in the formula name using the syntax $\{ @formula name \}$.



A formula cannot reference itself. You cannot reference any formulas that do not appear on the list in the Fields box.

Inserting Group Field Values in Formulas

You can enter group field values in formulas in one of two ways: via the Fields box, or manually.

 *Due to the syntax complexity for some group fields, it is highly recommended that you enter group fields by selecting them from the field list.*

Inserting group field values from the Fields box

To enter a group field via the list in the Fields scroll box, set the insertion point where you want the entry to appear in the formula.

Select the group field of interest from the scroll box list. Group fields appear in the list in a format similar to this:

```
Group footer #1:file.fieldname  
Action of fieldname
```

Crystal Reports inserts the selected group field in your formula, complete with the required braces, commas, condition fields, date fields, conditions, etc.

Inserting group field values manually


Follow the procedure below to enter a group field manually.

Step	Action
1.	To enter a group field manually in a formula, set the insertion point where you want the entry to appear.
2.	Select the function from the Functions list that matches the group field you want to insert. Crystal Reports inserts the function and all the required syntax items (parentheses, commas, etc.). The insertion point is automatically set for entering the first field.
3.	Select the first field from the fields list. Crystal Reports enters it at the insertion point, complete with braces.

4. Set the insertion point after the comma.
5. Select the second field from the fields list. Crystal Reports enters it at the insertion point, complete with braces.
6. If your sort and group by field is a date field, set the insertion point between the opening and closing quotation marks.
7. Type in the date condition (daily, weekly, monthly, etc.).

Your finished group field should have the following syntax:

- For a group triggered by a number, dollar, or string condition:
`Action({file.field}, {file.condField})`
- For a group triggered by a date or Boolean condition:
`Action({file.field}, {file.dateField}, "Condition")`

 *In order to use a group field in a formula, you must have already entered a group field in your report with identical parameters: same field, same sort and group by field, same condition (if applicable), and same action.*

Including Comments with Formulas

Comments are notes that you include with a formula to explain its design and operation. They can be invaluable for understanding the interaction of the various formula components when memory of your initial inspiration fades, or when someone else is editing the formula in your absence.

Comments don't print and they don't affect the formula, but they appear with the formula whenever you call the formula up for editing. It is always a good idea to include comments with complex formulas, especially those formulas that will be used again and again over time.

To include comments with formulas

Type your comments in the Formula Text box in the Formula Editor, the same box you use for creating the formula. The comment can be above or below the formula, or it can even follow the formula on the same line if it is preceded by two slashes. Any of the following placements are acceptable:

```
/ //This is an acceptable
//position for a comment.
//Note that when we force
//the line break, we have to
//begin each new line with
//double slashes.

if ({file.Amount} in (100.00 to 250.00)) then //This too
is an                                         //acceptable
      (.10 * {file.Amount})                //position
for a                                       //comment.
else
      0

//This is also an acceptable position for a comment.
```


Comment considerations

The following are considerations when including comments with formulas:

- The proper syntax for a comment is two slashes // followed by the comment. When Crystal Reports sees the two slashes, it realizes that the text that follows for the rest of the line is comment only and not to be included as part of the formula itself.
- Crystal Reports treats everything that follows the slashes on the same line as the slashes as a comment.
- If your comment is long and automatically wraps to the next line, no additional slashes are necessary; Crystal Reports treats it as one continuous comment.
- If you break your comment into two or more lines using the ENTER key, you must begin each new line with two slashes. If you don't, Crystal Reports treats each unslashed line as part of the formula itself and displays an error message when you check the formula syntax.

Deleting Formulas from your Report

When you create a formula and enter it in your report, Crystal Reports does two things:

- It stores the specification for creating that report using the name you assigned it
- It places a working copy of that specification at the point you specify in the report.

In order to delete formulas, you can delete:

- Individual working copies of the formula

or

- The specification and all working copies of the formula.



You cannot delete the specification without deleting all working copies of the formula.

Deleting individual formulas

To delete individual working copies of the formula, select the formula you want to delete and then:


- Click the right mouse button and select Delete Field from the pop-up menu that appears

or

- Press the DELETE key on your computer's numeric keypad

or

- Select **Edit/Clear**.

 *Even after you have deleted all of the working copies of a formula from your report, the formula specification remains unchanged. The specification is listed in the Insert Formula dialog box, and it is available for immediate use should you wish to enter the formula again in your report. To delete the formula specification, follow the steps below.*


Deleting the specification

To delete the specification (after you have deleted all working copies of the formula) follow the procedure below.

- | Step | Action |
|------|--|
| 1. | Once you have deleted all working copies of the formula, select Insert/Formula Field .

Response: The Insert Formula dialog box appears. |
| 2. | Select the formula specification you want to delete from the Formula name list.

Response: Crystal Reports activates the Delete button. |
| 3. | Click the Delete button, and Crystal Reports deletes the formula specification. |


 *If you haven't deleted all working copies of the selected formula, the program displays the following message: **Please delete all uses of the formula in the report first.***

Copying Formulas from Crystal Report Help


Windows 3.0 and 3.1 allow you to copy text from help topics to the Clipboard. You can then paste this text wherever it is needed. Since the formulas you develop using the Formula Editor are simply text, you can save yourself a lot of time by copying useful formulas directly into the Formula Editor and then modifying it to fit your needs. Follow the procedure below to copy formulas from Help.

- | Step | Action |
|------|--|
| 1. | With the Formula Editor active, call up the Crystal Reports Help facility in any of the standard ways (Help menu, Help button, F1 function key). |
| 2. | Regardless of the topic that first appears, use Search to find the topic that contains the formula of interest. |
| 3. | Call up the topic and select Edit/Copy .

Response: The Copy dialog box appears with the topic text displayed in a scrolling edit window.

 <i>Windows 95 and NT allow you to select text directly from the Help window.</i> |
| 4. | Scroll down through the topic until you locate the formula you want to copy. |
| 5. | Select the formula by dragging the I-beam cursor over it, and click the Copy button when finished.

Response: Windows puts a copy of the selected text into the Windows Clipboard.

 <i>In Windows 95 and NT, simply select the text you wish to copy and then press CTRL-C to copy.</i> |
| 6. | Place the insertion point where you want the text to appear in the Formula Editor and press SHIFT-INS to paste the text from the Clipboard. |
| 7. | Modify the formula to fit your needs. |

Help topic titles containing useful formulas

- All topics for individual functions and operators. (Locate by function/operator name or click the Contents button and call up the Functions or Operators index from the Reference Information section of *Index to Crystal Reports Help*.)

Other Help topics that contain useful example formulas are:

- *How to assign a value to a variable* contains example assignment statements for a variety of assignment scenarios.
- *How to create aging reports* contains a number of if-then-else formulas that can be modified and used to create aging reports.
- *Formulas in Action* leads you to a number of complex formulas for solving a variety of real world reporting problems.

If-then-else Formulas


If-then-else formulas are conditional formulas: if a condition is met, then a certain consequence, an action, takes place. If the condition is not met, some other action takes place. For example:

- If a sales rep has already earned the maximum allowable bonus, print the amount of the maximum bonus allowed; if he has not yet earned the maximum, calculate the bonus actually earned and print it.
- If the value in the title field is “Mr.”, print “Dear Mr.” as the beginning of the salutation; if it is not “Mr.”, print “Dear Ms.” as the salutation.
- If the quantity on hand of a part is equal to or less than the reorder amount, reorder according to the reorder instructions; if the quantity is greater than the reorder amount, do nothing.

These are just a few of the kinds of conditional formulas you can create using the If-then-else operator.

When using the If-then-else operator, remember that there must be three separate parts to any if-then-else formula:

- **The *if* part**
This part sets the condition.
- **The *then* part**
This part sets the action that takes place if the *if* condition is met.
- **The *else* part**
This part sets the action that takes place if the *if* condition is not met.

 *The data types (text, number, dollar amount, date, or boolean) for the then part and the else part must be the same.*

Thus, if the action that takes place if the condition is met (*then*) is to print a text string, the action that takes place if the condition is not met (*else*) must also be to print a text string, even if that text string is empty.

Multi-condition if-then-else Formulas

Crystal Reports allows you to create powerful multi-condition formulas using the If-then-else operator.

Multi-condition and nested if-then-else formulas can be set up in this general pattern: *if* the red (first) condition is met, *then*, go to the blue (second) condition. *If* the blue condition is met, *then* perform the blue action; if the blue condition is not met (*else*), perform the blue alternative. If the red condition is not met (*else*), perform the red alternative. Thus:

```
if {file.Color1} = "Red" then
if {file.Color2} = "Blue" then
    "Blue Action"
else
    "Blue Alternative"
else
    "Red Alternative"
```

This formula checks the field Color1.

- If the value of that field is "Red," it then checks the field Color2.
- If the value of that field is "Blue," it prints "Blue Action."
- If the value of Color2 is not "Blue," it prints "Blue Alternative."
- If the value of Color1 is not "Red," it prints "Red Alternative."

While multi-condition formulas look complex at first, after you've worked through one or two you'll find that they are not as intimidating as they seem, especially given the work they perform.

Concatenated Text Strings with Formulas

Concatenated text strings are simply strings of text that are tied together via a formula. Typically the first string exists in one field and the second string exists in another. Alternately, the first string exists in one field and it is combined with text that is typed directly into the formula.

One typical use of a concatenated text string is in the salutation of a form letter. The word “Dear” is typed directly into the formula and it is to be combined with the title from the *Title* field and the last name from the *Lname* field. The concatenation operator can be used to tie all three strings together.

When concatenating, there are a few simple things to keep in mind:

- All text that's typed directly into a formula must be enclosed in quotation marks.
- Text that's a value in a field doesn't require quotation marks; referencing the field is sufficient.
- Finally, if a space is to appear between two concatenated strings, the space must be entered within the quotation marks, either at the end of the first string or at the beginning of the second.

Formatting Text with Formulas

You can use formulas and functions to format text. Crystal Reports includes functions for removing unnecessary spaces from text strings, for converting text entirely to upper or lower case, etc. It also allows:

- The use of operators to join text from two different text fields

```
{file.FNAME} + " " + {file.LNAME}
```

«where the expression " " is a space to be inserted between the first and last name».

or to join text from a text field with text entered directly into the formula

```
"Dear " + {file.FNAME} + ", "
```

«where Dear, the space that follows Dear, and the comma that follows *FNAME* are text entered directly in the formula».

- It also includes functions to convert numbers to text so they can then be joined to other text strings

```
ToText({file.Quantity}) + " on hand"
```

«where *Quantity* is a numeric value and ToText is the function that converts the value of quantity to text. If *Quantity* = 5, this expression would read *5 on hand*».

Stacking Formulas and Fields

When you use an if-then-else formula, the data type of the *then* consequence must match the data type of the *else* consequence. In other words, you cannot have a formula like this:

```
if {file.AMOUNT} <> 0 then
    {file.AMOUNT}
else
    "Zero"
```


«where *file.Amount* is a numeric field».

- The data type of the *then* consequence *file.Amount* is a number.
- The data type of the *else* consequence field must be a number as well.

But in this formula, the else consequence is a string, "Zero".

Since the data types don't match, the program will not allow the formula and you will get an error message.

The formula above is trying to solve a real world reporting problem, i.e., to print a string instead of the number 0 to call particular attention to zero values. Fortunately, there is a way to get the results wanted, and that is by stacking fields and formulas (multiple fields and/or formula fields stacked on top of one another).


 *A stack of formulas is not a vertical stack of formula fields (vertical on the screen). When you stack formulas, the stack seems to build out from the screen, towards you (theoretically, not visually). A stack of formulas looks essentially like one formula, but the text inside the top formula box is garbled because the text from formula boxes lower in the stack is showing through as well.*

Reproducing the effect using a stack

Creating the effect from the formula above using stacked fields and/or formula fields follows the procedure below.

- | Step | Action |
|------|---|
| 1. | Insert the <i>file.Amount</i> field in the Details section of your report. |
| 2. | Format the <i>file.Amount</i> field so that nothing prints if the value in the field is zero. To do this, you format the field using the Suppress if Zero option in the Format Number dialog box (Page). At this point, the value in the <i>file.Amount</i> field will print <i>only</i> if it is something <i>other</i> than zero. |
| 3. | <p>Create an if-then-else formula that prints the word “Zero” if the value in the <i>file.Amount</i> field is zero and that prints nothing (an empty string) if the value in that field is something other than zero. (Search for <i>if-then-else formulas</i> in Crystal Help.)</p> <pre> if {file.AMOUNT} = 0 then "Zero" else "" </pre> |
| 4. | <p>Stack the formula field directly on top of the <i>file.Amount</i> field.</p> <ul style="list-style-type: none"> ■ Both stacked items (the <i>file.Amount</i> field and the formula field) are mutually exclusive. ■ Each one prints something only when the other one doesn't print. ■ By restricting our stack to mutually exclusive fields and formulas, we never run into a situation where two or more values print at the same time, thus putting unreadable and unsightly printing in your report. ■ As long as we restrict our stack to mutually exclusive items, we can put many items in the stack and still get only one value printing at a time. |

With this understanding of stacking theory and some careful planning and experimenting, you can create some very intelligent reports.

 *When fields are stacked in such a way that you can select more than one field, the field selected becomes the top field in the stack.*

Using Variables in Formulas

Crystal Reports allows you to use variables in formulas. While programmers need no introduction to variables, non-programmers may find the following discussion helpful.

Variables are a special kind of value that you can use in a formula. Unlike a constant value which is fixed and unchanging, a variable holds a value that may change from time to time.

A variable is like a container that can hold one value at a time. You assign a value to a variable, and the variable maintains that value until you later assign a new value. Then the variable maintains the new value until you later assign a newer value, etc.

When you use a variable in a formula, the formula looks to the variable and uses its current value in calculating the formula result. If the variable value changes, the formula looks to the new value and uses that to calculate a new result.

If you have a digital alarm clock, you're already familiar with a practical use of variables, even though you may not know what a variable is or that it is involved in the wake-up process. You set a time to get up, and the alarm goes off at the time set. You set a new time to get up and the alarm goes off at the new time. The time the alarm goes off depends on the value assigned to a variable in the clock's programming code. Here's how it works.

You set a time to get up, and the alarm clock stores that time in a variable we'll call `WakeUpTime`. If you set the alarm to get up at 7:00, for example, the clock stores 7:00 in `WakeUpTime`. The alarm goes off whenever the time of day (a variable we'll call `TimeOfDay`) matches the variable value. Thus, at 7:00, `TimeOfDay` matches the value stored in `WakeUpTime` and the alarm goes off.

A simple formula that shows this action is as follows:

```
If TimeOfDay = WakeUpTime then
    "Alarm"
else
    ""
```

This formula uses two variables because the time of day is changing constantly, and the wake up time can change to meet the user's needs.

Now if the alarm goes off and you decide to sleep a little longer, you may reset the alarm to 7:30. When you do this, you are, in effect, assigning a new value to the variable `WakeUpTime`. The clock replaces the `WakeUpTime` value 7:00 with the new value 7:30. This time the alarm goes off when the time of day matches the new variable value.

The alarm clock uses a variable to store the wake up time because the manufacturer knows that the wake up time will vary from person to person, and for a given person it may vary from day to day. Were the manufacturer to have used a constant for the wake up time instead of a variable, the alarm would go off at the same time every day for every person using it, a most inflexible situation.

Uses for variables

Variables can be used to solve many formula problems, but they have two primary uses:

- Streamlining formulas
- Expanding formula capabilities.

Using variables to streamline formulas

Variables allow you to write certain formulas much more efficiently than you can without using variables. For example, without using variables it takes this kind of formula to evaluate the `{customer.Telephone}` field to determine if the area code is for Washington (206, 509) or British Columbia, Canada (604):

```
if {customer.Telephone}[1 to 3] = "604" then
    "BC"
else
    if {customer.Telephone}[1 to 3] = "206" or
       {customer.Telephone}[1 to 3] = "509" then
        "WA"
    else
        ""
```

You have to write out the instructions for extracting the area code from the telephone number field (*{customer.Telephone}* [1 to 3]) every time you want the formula to use the area code from the current record.

But using a variable (we'll call it *AreaCode*), you write those instructions one time. Crystal Reports uses those instructions, automatically extracts the area code from the *{customer.Telephone}* field, and stores it in the variable each time it reads a new record. You simply reference the variable (*AreaCode*) whenever you want to use the area code from the current record in your formula. Here's an example of the formula using a variable:

```
StringVar AreaCode := {customer.Telephone}[1 to 3];
if AreaCode = "604" then
    "BC"
else
    if AreaCode = "206" or AreaCode = "509" then
        "WA"
    else
        ""
```

Not only does the streamlined version take less time to write, but it takes less time to process by Crystal Reports as well, so your report prints more quickly.

A word about semicolons in formulas

In a formula with multiple statements, the result of the final statement is the result that is returned (gets printed). When you have multiple statements in a formula, you must separate the statements using a semicolon so that Crystal Reports knows where one statement ends and the next begins. Without semicolons, Crystal Reports treats the entire formula as a single statement. In a multiple statement formula, this can result in an incorrect result or an error message.

The general rule that best describes the use of semicolons in multiple statement formulas is this:

- Every statement needs to end in a semicolon with two exceptions:
 - The last statement in a formula doesn't need one
 - The last statement before an "else" (when there are multiple statements before an else) doesn't need one.

Using variables to expand formula capabilities

Besides their impact on streamlining formulas, variables allow you to expand your formula writing capabilities. Before discussing the specifics of using variables in formulas, it is important to understand some things about the way the Formula Editor reads formulas.

How the Formula Editor reads formulas

Crystal Reports uses a sophisticated programming language in the Formula Editor. Because you can build formulas by picking fields, operators, and functions from lists of options, and because Crystal Reports supplies the required syntax elements when you build a formula by picking items from the list, that language is almost transparent for the most part (that is, there is not a lot of the language you have to remember).

Because of their special capabilities, however, variables:

- Come with a set of special requirements
- Require you to have a better understanding of the programming language than you might need if you didn't use variables in your formulas.

Special requirements for using variables in formulas

Until now, we've worked with formula elements that were pretty narrowly defined:

- A given operator only works in certain situations and with certain kinds of text and/or data
- A function only works with a specific number of arguments, and each argument must be a specific data type
- If-then-else formulas work only if the data type of the *else* part of the formula matches the data type of the *then* part.

Such narrow definition allows you to create formulas, in many cases, simply by filling in the blanks, with the formula checker pointing out any mistakes you make.

Variables, however, are not narrowly defined. They are extremely flexible; you make them what you want them to be. You create them at will, and you include them in formulas as needed.

Because of this flexibility, it is necessary for you to define (declare) the variables before you use them so that Crystal Reports:

- Is aware of them
- Understands how you intend to use them
- Can set aside and set up the memory space they require.

You also need to assign values to the variables so Crystal Reports knows what value they are to return.

Crystal Reports knows only what you tell it about the variables. The fail-safe formula-checker routines that work automatically with the other formula elements work with variables only after you define them.

To use a variable in a formula, you must do three things:


- Declare the variable
- Set the value of the variable
- Enter the variable in the formula.

Declaring the variable

Crystal Reports requires you to declare all variables prior to using them. When you declare a variable, you tell the program:

- The name you intend to use for the variable
- The type of data you want the variable to hold.


The program uses this information to set aside a piece of memory for receiving and storing the values that are assigned to the variable.

 *If you declare a variable with the same name and data type in two or more formulas, the formulas share the same variable. Thus, if one formula sets the value of the variable, the variable in the second (and additional formulas) reflects the change.*

Name

You can name the variable anything you wish with the following qualifications:

- The variable name must not exceed 254 characters.
- It can't have the same name as a Crystal Reports operator or built-in function.

 *As a general rule, you're probably better off if you keep the variable name short, easy to remember, and unique (not so close to the name of another variable as to cause confusion).*

Data type


The data type of a variable determines the type of data that can be stored as a value in that variable. With Crystal Reports, you can create a variable with one of five data types:

- Number
- Currency
- Boolean
- Date
- String.

The data types correspond to the data types used throughout Crystal Reports. (Search for *data types* in Crystal Reports Help.)

How to declare a variable

You declare a variable at the beginning of the formula that uses the variable.

 *If you are using a variable that was declared in another formula, it is necessary for you to declare it again.*

You declare the variable with a declaration statement that lists the data type, a space, the name you want to use for the variable, and a semicolon.

For example, to declare a number variable named *Amount*, you enter the following declaration statement:

NumberVar Amount;

If you want to declare a Boolean variable named *Outstanding*, you enter this for a declaration statement:

BooleanVar Outstanding;

If you want to declare both variables (or three, four, or more variables), you simply chain them together (making certain that each variable declaration statement ends in a semicolon). For example:

**NumberVar Amount;
BooleanVar Outstanding;
DateVar MonthEnd;**

Crystal Reports uses your declaration statement to set aside a block of memory to hold each of the variable values, and to assign a default value to each memory block. The default value assigned depends on the data type you declared for the variable. The default values assigned are as follow:

Variable Default Values

Data type	To declare	Default value
number	NumberVar	0
currency	CurrencyVar	0
Boolean	BooleanVar	False (No, 0)
date	DateVar	null date (Date(0,0,0))
string	StringVar	empty string ("")

How to assign a value to a variable

You assign a value to a variable using an assignment statement. The assignment statement consists of:

- The variable name
- The assignment operator
- The value you want to assign to the variable.

Variable name

The variable name is the name you used to declare the variable.

Assignment operator

The assignment operator is a colon followed by an equal sign (:=).

Variable value

The variable value is any value you want to assign to the variable. A variable value can be a constant, an expression, or a sequence of expressions.

Example assignment statement

Here are the assignment statements for assigning different kinds of values to variables:

```
Amount := 0
```

«Initializes (zero's out) the *Amount* variable.»

```
Amount := 100
```

«Assigns the value 100 to the *Amount* variable.»

```
Amount := Amount + {detail.QTY}
```

«Assigns the result of a calculation to the *Amount* variable. The calculation adds the value of the quantity field *{detail.QTY}* to the current value of the *Amount* variable. This expression is useful in running total situations where each running total consists of the current amount plus an additional value.»

```
Amount := {detail.QTY1} + {detail.QTY2} + {detail.QTY3}
```

«Totals the three quantity fields and assigns the total to the variable named *Amount*.»

```
Customer := "Westside Motors"
```

«Assigns the string “Westside Motors” to the variable named *Customer*.»

```
Customer:= {file.FNAME} + {file.LNAME}
```

«Concatenates two fields and assigns the concatenated value of both fields to the *Customer* variable.»

```
Customer:= TrimRight({file.FNAME}) + {file.LNAME}
```

«Trims the trailing blanks from the first name field ({file.FNAME}), concatenates that field to the last name field ({file.LNAME}), and assigns the concatenated value of both fields to the variable named *Customer*.»

```
Customer:= "Mr. " + {file.LNAME}
```

«Concatenates the string “Mr.” with the value of the last name field {file.LNAME}, and assigns the concatenated value to the variable named *Customer*.»

```
Amount:= 100; Customer:= "Westside Motors"
```

«Assigns the constant 100 to the number variable named *Amount*, and assigns the string “Westside Motors” to the *Customer* variable. You can assign values to multiple variables by separating the assignment statements with semicolons.»

Combining a variable declaration

For efficiency, Crystal Reports gives you the ability to declare a variable and assign it a value in a single line of formula code. To do this, simply declare the variable, allow a blank space, enter the assignment operator, and assign the value. For example, to declare a currency variable *SellPrice* and assign it the value of the *Cost* field ({file.Cost}) times two (a 100% markup), you would use this expression:

```
CurrencyVar SellPrice := {file.Cost} * 2;
```

To declare a Boolean variable *OverQuota* and assign it the result of the comparison {file.Sales}>{file.Quota}, you would use this expression:

```
BooleanVar OverQuota := {file.Sales}>{file.Quota};
```

To declare and assign values to multiple variables

In the previous section, you learned how to declare a variable and assign a value to it in a single step. There may be times, however, that you want to declare multiple variables and assign values to each of them in the most efficient manner possible. To do this, you simply chain the declaration/assignment expressions together, separating them with semicolons. For example, to declare two variables (a number variable *Quantity*, and a currency variable *SellPrice*) and then to assign values to each variable (the number 5 to the variable *Quantity*, and $\{file.Cost\} * 2$ to the variable *SellPrice*), you use chained expressions similar to the following:

```
NumberVar    Quantity := 5;
CurrencyVar SellPrice := {file.Cost} * 2;
```

Conditionally assigning values to variables

Crystal Reports' formula language gives you the ability to assign different values to variables based on conditions being met or not met. Consider the following formula:

```
NumberVar Total;
NumberVar Result;

Total:= Total + {invoices.ITOTAL};

If Next ({invoices.CNO})<>{invoices.CNO} then
    (Result:= Total;Total:= 0)
else
    Result:= 0;
Result
```

- The if-then-else part of this formula says that if the *if* condition is met (if the customer numbers [*invoices.CNO*] are not equal), Crystal Reports is to do two separate things:
 - Assign the value stored in the variable *Total* (the running total) to the variable *Result*, and
 - Reset the value in the variable *Total* to 0.
- If the if condition is not met (if the customer numbers are equal), Crystal Reports is to assign the value 0 to the variable *Result*.

Understanding the programming language

The Crystal Reports programming language has been developed as an *expression* language (in contrast to most programming languages which are *statement* languages).

Expressions

An expression is a calculation:

- That involves fields, constants, variables, and/or functions
- That is tied together by operators
- That results in a value.

For example, the calculation:

`1 + 1`

is a simple expression that results in the value 2.

The calculation:

`{file.Cost} < 10.00`

is another expression, this one resulting in the value Yes (for values in the *{file.Cost}* field of 9.99 and lower, and No for values in the *{file.Cost}* field of 10.00 or higher).

Expressions can contain subexpressions

Expressions can contain subexpressions. For example, the calculation:

`Sum ({file.Qty1}, {file.Qty2}, {file.Qty3})`

is an expression that results in the sum of the values found in the *{file.Qty1}*, *{file.Qty2}*, and *{file.Qty3}* fields. The expression, taken as a whole, results in a single value, which is the sum of the quantity fields. This expression, however includes three arguments (*{file.Qty1}*, *{file.Qty2}*, and *{file.Qty3}*), each of which is an expression in its own right. For example, *{file.Qty1}* can stand alone as a complete formula because it returns (results in) the value of the *{file.Qty1}* field. The other arguments can stand alone for the same reason.

Expressions can be joined in sequence

A sequence of expressions can be joined by semicolons. For example, the expression:

`1 + 1`

can be joined to the expression:

`"abc"`

with a semicolon:

`1 + 1; "abc"`

When expressions are joined in sequence by semicolons, Crystal Reports evaluates each expression in order, but the result of the last expression becomes the result for the entire sequence.

The semicolon is of critical importance when working with variables in multi expression formulas. (Search for *semicolons in formulas* in Crystal Reports Help.)

Example # 1

Formula

```
StringVar AreaCode := {customer.Telephone}  
[1 to 3];  
  
if AreaCode = "604" then  
    "BC"  
else  
    if AreaCode = "206" or AreaCode = "509" then  
        "WA"  
    else  
        ""
```

Purpose


For a database of Washington and British Columbia customers, you want Crystal Reports to determine and print a state or province abbreviation for each record based on the area code portion (the first three characters) of the telephone number field.

Explanation

StringVar AreaCode := {customer.Telephone} [1 to 3];

«Declares a string variable, names it *AreaCode*, and assigns to that variable the value of the first three characters ([1 to 3]) of the telephone number field ({customer.Telephone}). This tells Crystal Reports:

- To set aside a block of memory to hold variable number values
- To name that memory block *AreaCode*, and, as it reads each record
- To store the first three characters of the telephone number field in the *AreaCode* variable.»

 *Note the difference from the earlier examples in which the variables were declared but left with no value assigned until later in the formula. In this case the variable is declared and a value is assigned in a single line of formula code.*

With this arrangement, when the word *AreaCode* is used in the formula, Crystal Reports is to use the value stored in the *AreaCode* memory block (the area code for the current record) in place of the word *AreaCode*.

```
if AreaCode = "604" then
    "BC"
else
    if AreaCode = "206" or AreaCode = "509" then
        "WA"
    else
        ""
```

This is a fairly standard If-then-else formula. It references the variable *AreaCode* instead of a database field from which the area code can be extracted.

The first line:

```
if AreaCode = "604" then
```

The first line (the first if condition) says that if the value of the *AreaCode* variable is "604" (the BC area code), the first then part of the formula should be triggered.

The second line:

```
"BC"
```

«Indicates what is to happen if the first *if* condition is met (if the area code is 604). When the first if condition is met, the formula is to print the characters "BC".»

The third and fourth lines:

```
else
    if AreaCode = "206" or AreaCode = "509" then
```

«Indicate what is to happen if the first if condition is not met (if the area code is not 604). This circumstance triggers the first else part of the formula. The else action is a second if condition. The formula is to evaluate the *AreaCode* variable and determine if the value of that variable is either "206" (Washington) or "509" (also Washington). If it is, then the second then part of the formula should be triggered.»

The fifth line:

"WA"

«Indicates what is to happen if the second if condition is met (if the area code is either 206 or 509). When the second if condition is met, the formula is to print the characters "WA".»

The sixth and seventh lines:

else

""

«Indicates what is to happen if the second if condition is not met (if the area code is not 206 or 509). If the second if condition is not met, the formula is to print the empty string "" (that is, print nothing). This would happen in the rare case that the area code was typed into the telephone number incorrectly, that it was left out of the telephone number entirely, or that a record with a telephone number outside BC and Washington was inadvertently entered into the database.»

Notes to consider

In this formula, the entire if-then-else part of the formula follows the only semicolon (the semicolon at the end of the variable declaration/assignment statement). Since it follows the last (only) semicolon, the if-then-else formula, taken as a whole, becomes the final statement in the formula, and the result of that if-then-else formula ("BC", "WA", or "") is what gets printed.

While this formula can be done without variables, the formula takes less time to write, consumes less memory, and prints more quickly than a similar formula without the use of variables.

Example # 2

Formula

```
NumberVar  Runtotal;  
  
If Previous({detail.INO})<>{detail.INO} then  
    Runtotal:= 0  
else  
    0;  
  
Runtotal:= Runtotal + {detail.LTOTAL}
```

Purpose

Crystal Reports may be used to prepare invoices. Each invoice is made up of one or more line items drawn from a database of invoice details. You want Crystal Reports:

- To keep a running total of the line items for each invoice,
- To print the running total as it processes each record,
- To print the invoice total when the invoice number changes, and
- To reset the running total calculator to 0 prior to reading the first record for the next invoice.

Explanation

```
NumberVar  Runtotal;
```

«Declares a number variable and names it *Runtotal*. This tells Crystal Reports to set aside a block of memory to hold variable number values, and to name that memory block *Runtotal*. With this arrangement, if the word *Runtotal* is used in a formula, Crystal Reports is to use the value stored in the *Runtotal* memory block in place of the word *Runtotal*.»

```
If Previous({detail.INO})<>{detail.INO} then
    Runtotal:= 0;
else
    0;
```

«This is the heart of the formula. It performs important side events (sets variable values) that impact the formula output (the result of the last statement in the formula).»

The first line:

```
If Previous({detail.INO})<>{detail.INO} then
```

is the *if* part of the formula. It uses the Previous function to evaluate the value of the invoice number field (*{detail.INO}*) for the previous record. It then compares that value to the value of the invoice number field for the current record.

- When the two values are equal, the invoice numbers are the same indicating that the next record belongs to the same invoice.
- When the two numbers are not equal, the invoice number changes signaling the start of a new invoice.

The *then* part of the formula triggers when the numbers are not equal, that is, it triggers whenever the invoice number (and hence the invoice) changes.

The second line:

```
Runtotal:= 0;
```

«Tells what is to happen if the *if* condition is met (if the invoice number changes). When that condition is met, the formula is to reset the value of the variable *Runtotal* to 0 (*Runtotal:= 0*). It resets the value so that the calculations for the current invoice begin with 0 rather than with a residual value from the previous invoice.»

The third and fourth lines:

```
else
    0;
```

«Tell what is to happen if the condition is not met (if the invoice numbers are equal, indicating that the invoice number has not changed). When the if condition is not met, the formula is to return the value 0 for the current record.»

The final line of the formula:

```
Runtotal:= Runtotal + {detail.LTOTAL}
```

«Uses the assignment operator ($:=$) to assign a value to the variable named *Runtotal*. In this case, the value assigned is the result of a calculation. That calculation is the current value of the variable *Runtotal* plus the line total (*{detail.LTOTAL}*) for the current invoice. This line is used to track a running total for the invoice. For example, if the records indicate line totals of 100, 200, and 450 respectively, the value of the variable *Runtotal* (the running total for the current invoice) changes as follows:

Changes in value of the variable *Runtotal*

detail.INO# (Invoice Number)	Runtotal	Line Total (LTOTAL)	Calculation (Runtotal + LTOTAL)	Invoice Total
1001	0	100	0 + 100	0
1001	100	200	100 + 200	0
1001	300	450	300 + 450	0
	750			750
1002	0	375	0 + 375	0
1002	375	100	375 + 100	0
	475			475
1003	0	200	0 + 200	0
1003	200	240	200 + 240	0
1003	440	150	440 + 150	0
	590			590
1004	0	100	0 + 100	100

Since this is the final statement in the formula, the result of this statement is the formula output (what gets printed).

Example # 3

Formula

```
NumberVar      Total;  
NumberVar      Result;  
  
Total:= Total + {invoices.ITOTAL};  
  
If Next ({invoices.CNO})<>{invoices.CNO} then  
    (Result:= Total;  
     Total:=0)  
else  
    Result:= 0;  
Result
```

Purpose

This formula is designed to keep a running total of the invoices for each customer, and to print the total of all invoices for the customer once the final record for that customer is processed.

The formula is set to print a zero (0) for each record that it processes that is not the final record for the customer. (Since the *if* part of the formula results in a number, the *else* part must result in a number too. The number zero satisfies that formula requirement.) If you format the formula field using the Format Number/Suppress if Zero option (search for *Format Number dialog box* in Crystal Help). Crystal Reports hides all the zero values, and the net effect is to show customer totals only.

Explanation

```
NumberVar  Total;
```

«Declares a number variable and names it *Total*. This tells Crystal Reports to set aside a block of memory to hold variable number values, and to name that memory block *Total*. With this arrangement, if the word *Total* is used in a formula, Crystal Reports is to use the value stored in the *Total* memory block in place of the word *Total*.»

NumberVar Result;

«Declares a number variable and names it *Result*. This tells Crystal Reports to set aside another block of memory to hold variable number values, and to name that memory block *Result*. With this arrangement, if the word *Result* is used in a formula, Crystal Reports is to use the value stored in the *Result* memory block in place of the word *Result*.»

Total:= Total + {invoices.ITOTAL};

«Uses the assignment operator (:=) to assign a value to the *Total* variable. In this case, the value assigned is the result of a calculation. That calculation is the current value of the variable *Total* plus the invoice total ({*invoice.ITOTAL*}) for the current invoice. As further lines of the formula will reveal, this line is used to total the value of invoices for a given customer. For example, if the records indicate invoice totals of 100, 200, and 450 respectively, the value of the variable *Total* (the total value of invoices for a given customer) changes as follows:»

Changes in the value of the variable Total

Total	Invoice Total (ITOTAL)	Calculation (Total + ITOTAL = new Total)
0	100	0+100
100	200	100+200
300	450	300+450
750		

Table shows how *Total*'s value is changed by the formula line
Total :=Total+{invoices.ITOTAL}

```

If Next ({invoices.CNO}) <> {invoices.CNO} then
    (Result:= Total;
    Total:=0)
else
    Result:= 0;
```


«This is the heart of the formula. It performs important side events (sets variable values) that impact the formula output (the result of the last statement in the formula).»

The first line:

```
If Next ( {invoices.CNO} ) <> {invoices.CNO} then
```

«is the *if* part of the formula. It uses the Next function to evaluate the value of the customer number field (*{invoices.CNO}*) for the next record. It then compares that value to the value of the customer number field for the current record.

When the two values are equal, the customer numbers are the same indicating that the next record belongs to the same invoice.

When the two numbers are not equal, the customer number changes signaling the start of a new invoice.

The *then* part of the formula triggers when the numbers are not equal, that is, it triggers whenever the customer number (and hence the invoice) changes.»

The second and third lines:

```
(Result:= Total;  
Total:=0)
```

«Tell what is to happen if the if condition is met (if the customer number changes). When that condition is met, the formula is to assign the value of the variable *Total* to the variable *Result* (*Result:= Total;*) and then reset the value of the variable *Total* to 0 (*Total:= 0*). It resets the value so that the calculations for the next invoice begin with 0 rather than with a residual value from the current invoice.»

The final line:

The final line of the if-then-else formula (*Result:= 0;*) is the else part of the formula, the action that is to take place when the if condition is not met (if the customer number does not change). When that condition is not met, the formula is to assign the value 0 to the variable *Result*.

Result

«This line says to print the value of the variable *Result*. The value printed is determined by the outcome of the if-then-else formula that precedes it.

- If the if condition is met (if the customer number changes), the value of the variable *Result* is the value of the variable *Total* before it was reset to 0.

Thus, if *Total* had begun at 0 and the invoice totals (values of the {*invoices.ITOTAL*} field for each record with the same customer number) had been added to it, the value of the variable *Total* that is assigned to the variable *Result* (and is printed) is the total of all invoices for the customer.

- If the if condition is not met (if the customer number does not change), the value of the variable *Result* is set to 0, and the formula prints the value 0.»


The following data shows the interrelationship between the variables and the output from this formula:

Interrelationship between variables and output

Cust#	Total	InvoiceTotal (ITOTAL)	Calculation (Total + ITOTAL)	Result
1001	0	100	0 +100	0
1001	100	200	100+200	0
1001	300	450	300+450	0
	750			750
1002	0	375	0+375	0
1002	375	100	375+100	0

Interrelationship between variables and output

Cust#	Total	InvoiceTotal (ITOTAL)	Calculation (Total + ITOTAL)	Result
	475			475
1003	0	200	0+200	0
1003	200	240	200+240	0
1003	440	150	440+150	0
	590			590
1004	0	100	0+100	0

 You can achieve the same results as you do with this formula by subtotaling the invoice total field {invoices.ITOTAL} every time the value changes in the customer number field {invoices.CNO}, and by placing the subtotal on the same line in the Details section as the invoice total field.

Order of Precedence

When entering formulas that contain different kinds of operators, it is important to consider order of precedence, the order in which Crystal Reports performs the operations in your formula.

You learned simple order of precedence in high school math: when performing calculations, do multiplication and division first, then addition and subtraction. Thus:

$$5 + 10 \times 3 = 35$$

The calculation 10×3 is performed first to get 30. 30 is then added to 5 to arrive at the final answer.

Now if your intention is to add 5 to 10 and then multiply the sum by 3, you have to modify the order of precedence with parentheses. You can do that thus:

$$(5 + 10) \times 3 = 45$$

It's clear that parentheses have a higher precedence than the add, subtract, multiply, and divide operators. They redirect the order of calculation.

You learned all of this in school and Crystal Reports follows the same rules of precedence. But Crystal Reports uses many additional operators, and it's important for you to understand the precedence the program assigns to each so you can write your formulas to perform as expected.

- In the following list, Crystal Reports performs the top level operations first, then the second level, then the third, and so forth.
- When it encounters two or more operations that are on the same level, it performs them left to right.

Level 1	Parentheses, Arrays, If Then Else
Level 2	Functions, Subscript
Level 3	+ sign in front of value, Negate, Dollar, Not
Level 4	Multiply, Divide, Percent
Level 5	Add, Subtract

Level 6	To
Level 7	Less than, Greater than, Greater than or equal, Less than or equal, In
Level 8	Equal, Not equal
Level 9	And
Level 10	Or

Precedence examples

Example 1

If 24 in [(7-1) *4, 7- 1*4] then

"Hit"

else

"Miss"

This formula consists of the following components:

Precedence Example No. 1

Order of appearance	Order of precedence
If-then-else operator	Parentheses
In array operator	Make array operator
Make array operator	If-then-else operator
Parentheses	Multiply operator
Subtract operator	Subtract operator
Multiply operator	In array operator

- The calculation in the parentheses is done first. That redirects the order of calculation so that
 $(7-1)*4 = 24$ while $7-1*4 = 3$.

- Crystal Reports makes the array next. The array consists of two values: 24 and 3.
- Finally, the If then else operator uses the calculated values in the array as the *If* condition.

Example 2

`Average([ToNumber("12345"[3 to 4]), ToNumber("2468"[2 to 3])])`

This formula consists of the following components:

Precedence Example No. 2

Order of appearance	Order of precedence
Average	Parentheses
Parentheses	ToNumber
ToNumber	Subscript
Subscript	Average

- This calculation uses the function ToNumber to convert the strings "12345" and "2468" to numbers.
- Once converted, it uses the Subscript operator to pull out the 3rd and 4th digits in the first number (34) and the 2nd and 3rd digits in the second (46).
- These two numbers are then averaged to arrive at the number 40 (80/2 = 40).
- The Average function is on hold to the very end because the rest of the calculations take place within parentheses which gives them primary precedence.

Example 3

```
ToText(Abs({file.quota}-{file.sales})/
{file.quota} * 100) + "%"
```

This formula consists of the following components:

Precedence Example No. 3


Order of appearance	Order of precedence
ToText function	Parentheses
Parentheses	Abs function
Abs function	Divide operator
Divide operator	Multiply operator
Multiply operator	ToText function
Concatenate operator	Concatenate operator

- The work inside the parentheses is done first. If there are parentheses inside parentheses, the work in the innermost parentheses is done first. Thus the subtraction of *{file.sales}* from *{file.quota}* is performed first.
- The Abs function is performed next because it is inside the primary parentheses and because it takes precedence over the divide and the multiply operators that are also inside the parentheses.
- Once the absolute value of the difference between *{file.quota}* and *{file.sales}* is calculated, that value is divided by *{file.quota}* and the result is multiplied by 100. (The divide and multiply operators have equal precedence so they are used in the order they appear from left to right.)
- The result of this calculation is then converted to text using the ToText function. Now we're outside the parentheses so the ToText function takes precedence over the Concatenate operator (+).
- Finally, the percentage character "%" is concatenated to the calculated value which has been converted to text. This creates one continuous text string.


Formula Evaluation Time Considerations

Crystal Reports evaluates different formulas at different times, depending on formula content.

- If no database or group field is included in the formula, the formula is evaluated before the program reads database records. This is because nothing in the formula is dependent on data drawn from database records or assigned only at print time.
- If a database field is included in the formula, the formula is evaluated while the program reads database records. This is because the database field information must be drawn from the database records before it can be used in the formula.
- If a group field, page number field, subtotal, etc. is included in the formula, the formula is evaluated after database records are read and while the data from the records is being printed in the report. This is because the value of one or more of the elements in the formula won't be assigned until the report is organized and formatted for printing.

 *A formula is always evaluated based on the element in the formula with the latest evaluation time. Thus, if a database record and a page number field are used in the same formula, the page number field (the field with the latest evaluation time) will force the formula to be evaluated while printing records.*

In most cases, evaluation time won't be an important consideration as you develop formulas. But in certain cases, standard evaluation times will generate unsatisfactory results. In such cases you will need to force a later evaluation time than usual for the problem formulas. Crystal Reports includes two evaluation time functions you can use in your formulas for this purpose: *WhileReadingRecords*, and *WhilePrintingRecords*. It includes a third evaluation time function, *BeforeReadingRecords*, that you can use in your formulas to clarify the evaluation time relationships between the various formulas.

 *You can only force a later evaluation time, never an earlier one. Hence, *BeforeReadingRecords* (the function with the earliest evaluation time) can never be used to force a non-standard evaluation time on a formula.*

The following example illustrates a typical evaluation time problem and its solution using one of the evaluation time functions.

Example using an evaluation time function

This example illustrates the use of an evaluation time function to take a formula that would normally be evaluated while reading records and force it instead to be evaluated while printing records.

Scenario

You want to create an order detail report that:

- Shows the extended price for each line item
- Calculates a running total for each line
- Resets itself to 0 for each new order.

Unless you disabled the *Samples and Examples* option during installation, the report, called EVALTIME.RPT, is one of the sample reports that was installed on your system. An example showing partial data from that report follows:

Order Detail Report

Order#	Item#	Qty	Price	Extension	RunTotal
2203					
2203	1002	3	276.00	828.00	828.00
2203	1102	1	1230.00	1230.00	2058.00
			Total for order 2203		2058.00
2204					
2204	1001	7	192.00	1344.00	1344.00
2204	1002	3	276.00	828.00	2172.00
2204	1003	1	484.00	484.00	2656.00
2204	1102	3	1230.00	3690.00	6346.00
			Total for order 2204		6346.00

The report uses four database fields:

Order#	{detail.ORDERNUM}
Item#	{detail.ITEMNUM}
Qty	{detail.QTY}
Price	{detail.PRICE}

It uses three formulas:

@extend

```
{detail.QTY} * {detail.PRICE}
```

«*@extend* simply calculates the extended price for a line item (quantity ordered times price per item). This provides the values in the *Extension* column.»

@initialize

```
NumberVar Runtotal;
If {detail.ORDERNUM} <> Previous ({detail.ORDERNUM}) then
    Runtotal := 0
else
    Runtotal := Runtotal
```

«*@initialize* resets the variable *Runtotal* each time the order number changes so the running total for each order begins at 0.»

@running

```
WhilePrintingRecords;
NumberVar Runtotal;
Runtotal:= Runtotal + {@extend}
```

«*@running* calculates the running total for each order by adding the extended price for each line item to the existing running total for the order. This provides the values in the *Running Total* column.»

And it includes one subtotal:

Sum of @extend

Group footer #1: detail.ORDER
Sum of @extend

«It subtotals the extended price each time the order number changes, thus providing the *Total for order nnnn* order total.»

The evaluation time problem in this report

The evaluation time problem which is solved with one of the evaluation time functions involves the relative evaluation time of two formulas, *@initialize* and *@running*.

- *@initialize* includes the Previous function which is evaluated while records are printed. Any formula that includes the Previous function, therefore, will be evaluated while the records are printing as well.
- *@running*, on the other hand, is normally evaluated while records are read.

If we leave both formulas to be evaluated at their normal times,

- *@running* is evaluated first (during record read time) and it outputs running totals for each line item.
- Then, after it is finished calculating the running totals, *@initialize* is evaluated (during record print time). This formula initializes (sets to 0) the *Running Total* variable each time the order number changes.

By this time it's too late. The running totals have already been calculated without being initialized between orders. The final printed report shows running totals getting bigger with each line item; they are not reset from order to order.

Your report comes out looking like this:

Order Detail Report

Order#	Item#	Qty	Price	Extension	RunTotal
Order #2203					
2203	1002	3	276.00	828.00	828.00
2203	1102	1	1230.00	1230.00	2058.00
			Total for order 2203		2058.00
Order #2204					
2204	1001	7	192.00	1344.00	1344.00
2204	1002	3	276.00	828.00	2172.00
2204	1003	1	484.00	484.00	2656.00
2204	1102	3	1230.00	3690.00	6346.00
			Total for order 2204		6346.00

- @Running doesn't include evaluation time function

To solve this problem, you must make certain that *@initialize* is evaluated at the same time as *@running*. You can't force a print time evaluation formula (*@initialize*) to evaluate at read time (forcing it to be evaluated before the required data is available), but you can force a read time evaluation formula (*@running*) to evaluate later, at print time. You do this by starting the formula (as we did) with the function ***WhilePrintingRecords***;

```
WhilePrintingRecords;
NumberVar Runtotal;
Runtotal:= Runtotal + {@extend}
```

When you do this, your report comes out looking like you want it, like this:

Order#	Item#	Qty	Price	Extension	RunTotal
Order #2203					
2203	1002	3	276.00	828.00	828.00
2203	1102	1	1230.00	1230.00	2058.00
			Total for order 2203		2058.00
Order #2204					
2204	1001	7	192.00	1344.00	1344.00
2204	1002	3	276.00	828.00	2172.00
2204	1003	1	484.00	484.00	2656.00
2204	1102	3	1230.00	3690.00	6346.00
			Total for order 2204		6346.00

Copying Formulas from one Report to Another You may find yourself wishing to copy a formula created in one report for use in a new (or different) report. Copying formulas from one report to another is a simple procedure, but it requires careful attention to detail.

Since formulas are stored as text, it is a simple matter to copy the text formula from one report to another via the Windows Clipboard. Once the formula is copied however, you need to consider the following points:

- All fields, formulas, and group fields referenced in the formula copy must actually exist in the new report. This means that any database referenced in the original formula (or a database with the same structure, field names, and alias) must be active in the new report.

If such a database isn't active, you must change the field, formula, and group field references in the formula copy to correspond to elements in your.

- If your formula contains conditional elements, make certain that the conditions apply to the data in the new report. For example, if the formula in your old report performed an action when the quantity was greater than 100, make sure that the *greater than 100* condition makes sense in the new formula. When modifying a formula, you may find that *greater than 10* or *greater than 2000* makes more sense with your new data.
- If you are using the formula with new data, and if your report contains statements similar to this:

```
if{file.value} = "text string"
```

make certain that the text strings used in the formula match values that actually exist in the new data.

Follow the procedure below to copy a formula from one report to another.

Step

Action

1. Call up the Formula Editor with the formula that you want to copy. You can do this by clicking the formula in your report and then:
 - Selecting **Edit/Formula**, or
 - Selecting Edit Formula from the right mouse button menu.
2. Highlight the formula in the Formula Editor by dragging the I-beam cursor over it while keeping the left mouse button depressed. Release the mouse button when you're finished.
3. Press CTRL-INS (the Windows Copy command).

Response: Windows sends a copy of the formula to the Clipboard.

4. Close the dialog box, close the existing report, and open the report to which you want to copy the formula.
5. Select **Insert/Formula** Field.


Response: The Insert Formula dialog box appears.

6. Enter the name under which you want to save the copied formula and click OK when finished.

Response: The Formula Editor appears with the insertion point flashing.

7. Press SHIFT-INS (the Windows Paste command). Windows pastes the formula copy at the insertion point.

8. Change the fields, formulas, group fields, conditional statements, and text strings if necessary for use with the data used in the new report.


 *To make these changes (if necessary), delete the old values and type in the new values, or select them from the Fields, Functions, and/or Operators lists.*

9. Click Accept when finished. The rectangular placement cursor appears.
10. Position the cursor where you want the formula to appear, and click the left mouse button to place it.

How Crystal Reports Works with SQL and ODBC

With Crystal Reports, you can create reports with data from a variety of SQL and non-SQL data sources. While the files for using SQL databases are only available in the Professional Edition of Crystal Reports, the Standard Edition includes a number of SQL-oriented features. These features are in the program because the Standard Edition supports the use of Excel, ACCESS, and ASCII files via ODBC which uses the SQL language.

This chapter shows you how to use Crystal Reports with data from SQL databases and databases that utilize ODBC.

 *Throughout this chapter, the term SQL refers to both SQL and ODBC data sources unless otherwise specified.*

Logging onto a SQL server


Crystal Reports provides three ways of logging on to a SQL server:

- Logging on as part of the report creation process
- Logging on outside the report creation process
- Logging on using the Query Expert.

Logging on while creating a report

You can log onto a server as part of the process of activating a SQL table for use in a report.

Whenever you select **File/New/Report**, **File/New/Mailing Label**, **File/New/Cross-Tab** or **Database/Add File to Report**, the Choose Database File dialog box appears.

 *If you use the Report Gallery and select SQL Table as your from: source, you go directly to the Log On Server dialog box, bypassing the Choose Database File dialog box.*


You can use this dialog box to select a non-SQL database file for use in your report, but you can also use it as a gateway for logging on to a SQL server and activating a database and table for use in your report.

Activating a SQL database/table

Follow the procedure below to activate a SQL database/table during the report creation process.

Step	Action
1.	To begin the report creation process, do one of the following: <ul style="list-style-type: none">■ If you want to select the first SQL table for use in a report (and no other non-SQL databases or tables are active), select File/New/Report.■ If you want to select the first SQL table for use in a mailing labels report (and no other non-SQL databases or tables are active), select File/New/Mailing Label.■ If you want to select the first SQL table for use in a Cross-tab report (and no other non-SQL databases or tables are active), select File/New/Cross-tab.

- If you want to select the first SQL table for use in a report (and other non-SQL databases are already active), select **Database/Add File to Report**. The Choose Database File dialog box appears.


 *If you have it activated, the Report Gallery appears at this time unless you have set your SQL Options (via **File/Options**) to go directly to a specific server. Once in the Report Gallery, select SQL Table as your from: source and you'll go directly to the Log On To Server dialog box.*

2. Click the SQL Server button.

Response: The Log On to Server dialog box appears listing the various SQL server types available on your system.

3. Select the server type that you want to log on to and click OK when finished.


Response: A dialog box appears requesting server-specific login information. use this dialog box to identify yourself and to specify the database you want to activate.

 *If you want to activate multiple databases from the same server, you will need to log on to the server each time you want to activate a database.*

Some of the following items will be in the dialog box (depending on the server type requested).

- **SQL Server**

Enter the name of the SQL server you want to log on to.

 *For ODBC users, SQL Server name is the ODBC Datasource name.*

- **Database**

Enter the name of the database you want to activate in the specified SQL server.

- **User ID**

Enter the name you use to log on to the specified server.

- **Password**

Enter the password you use to log on to the specified server.

- **Dict Path**

When using Netware SQL, enter the path for the data dictionary (.dbf) files.

- **Data Path**

When using Netware SQL, enter the path for the data files. Enter the requested login information and click OK when finished. Crystal Reports logs you onto the specified server and takes you to the Choose SQL Table dialog box.

Action: The Choose SQL Table dialog box works in a similar manner to the Choose Database File dialog box. You use the Choose SQL Table dialog box to select the table you want to activate for use in your report.

The dialog box contains three smaller boxes and two buttons (in addition to the OK, Cancel, and Help buttons).

- **SQL Tables box**

The SQL Tables box lists all of the tables in the active database. Select the table you want to include in your report.

- **SQL Databases box**

The SQL Databases box lists all of the databases you have activated. Select the database that contains the table you want to use in your report.

- **Server Info box**

The Server Info box identifies the active server, the active database, and the user who activated them.

- **Log On Server button**

The Log On Server button returns you to the Log On To Server dialog box. You can use this button when you want to activate another database. When you return to the Log On To Server dialog box, select the server type and Click OK, and then enter the name of the database you want to activate and the other requested login information in the Server Login dialog box when it appears.

- **Database File button**

The Database File button takes you to the Choose Database File dialog box. Once in that dialog box you can activate non-SQL databases for use in your report.

Logging on outside the report creation process

You can log onto a SQL server using the Database|Log On Server command when you first call up Crystal Reports (or at any other time while using the program). The Log On Server command was created for those times you want to log onto a SQL server to have the server and database activated and standing by for later use in a report. For example, if you want to review or revise an existing report and then create a new report using a SQL table, you might log on to the SQL server and activate a database when you first call up Crystal Reports. Then, when you're finished revising the existing report, you can select a SQL table from the active server/database and create your new report.

To log on, use the **Database/Log On Server** command below.

Activating additional tables from a SQL database

When you have already activated one table in a SQL database and you want to activate an additional table from that database, use the following procedure.

Step

Action

1. Select **Database/Add File to Report**.

Response: The Choose SQL Table dialog box appears.

2. Select the table you want to activate and click OK when finished.

Response: The Choose Tables To Use In Graphical Linking dialog box appears. All the tables you have selected appear in the Invisible Tables box in the Unlinked Tables section of the dialog box.


Action: To set up graphical linking between the tables, click the All button. The program moves all the table names to the Visible Tables box.

3. Make sure the Perform Smart Linking switch is active if you want the program to suggest link fields for you.
4. Click OK when finished.

Response: The Graphical Linking dialog box appears with graphical representations of each of your selected tables. If you activated the Perform Smart Linking switch, there will be a line between the fields the program suggests for linking the tables.

Action: Do one of the following:

- If there is a suggested link and you want to accept it, click OK.
 - If there is a suggested link and you don't want to accept it, select the linking line for the link you want to change. The program highlights the linked fields when you select the linking line. Click the right mouse button and select Delete Linking from the menu or click the Delete Linking button to remove the link.
 - To create a new link, drag the link field in one table to the link field in another table. Repeat the process for each additional link you need to make and click OK when finished.
 - If you want to specify the kind of join the program makes, click the Link Options button. The Link Options dialog box appears with only the join options active. Since different SQL servers offer different join options, the options that appear in the scroll list will vary from server to server. For an explanation of each of the join options that appear on your list, please see the SQL manual.
5. Once your links are satisfactory, click OK and the program activates the selected table and returns you to the Design window.
 6. Repeat Steps 1-6 for each additional table you want to activate from the active SQL database.

 *If you have logged on to a SQL database and you want to activate a new table but from a different SQL database, click the Log On Server button in the Choose SQL Table dialog box. This returns you to the Log On To Server dialog box where you can select the server type for the next database you want to activate.*

SQL Menu Commands

The following three commands appear on the Crystal Reports Database menu.

- Log On Server
- Log Off Server
- Show SQL Query.

Log On Server (I)

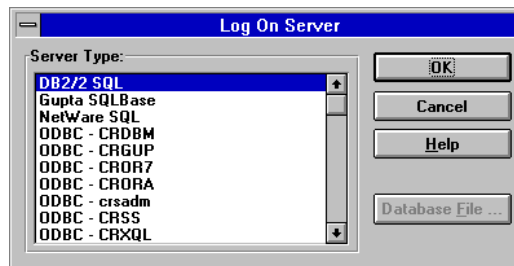


Figure 6-1. Log On Server dialog


Use **Database/Log On Server** to log onto a SQL database server.

Using Database/Log On Server

Follow the procedure below to use **Database/Log On Server**.

- | Step | Action |
|------|---|
| 1. | Select Database/Log On Server . |
| | Response: The Log On To Server dialog box appears. |
| 2. | In that dialog box, the SQL Types box lists the various SQL server types that are available to your system. Select the server type that you want to log on to and click OK when finished. |
| | Response: A dialog box appears requesting server-specific login information. |

3. You use this dialog box to identify yourself and to specify the database you want to activate.

 *If you want to activate multiple databases from the same server, you will need to log on to the server each time you want to activate a database.*

Some of the following items will be in the dialog box (depending on the server type requested).

- **SQL Server**

Enter the name of the SQL server you want to log on to.

 *For ODBC users, SQL Server name is the ODBC Datasource name.*

- **Database**

Enter the name of the database you want to activate in the specified SQL server.

- **User ID**

Enter the name you use to log on to the specified server.

- **Password**

Enter the password you use to log on to the specified server.

- **Dict Path**

When using Netware SQL, enter the path for the data dictionary (.dbf) files.

- **Data Path**

When using Netware SQL, enter the path for the data files. Enter the requested login information and click OK when finished. Crystal Reports logs you onto the specified server and returns you to the Crystal Reports Window (or to the Design window if you were in the Design window when you chose the **Database/Log On Server** command).

Log Off Server (I)

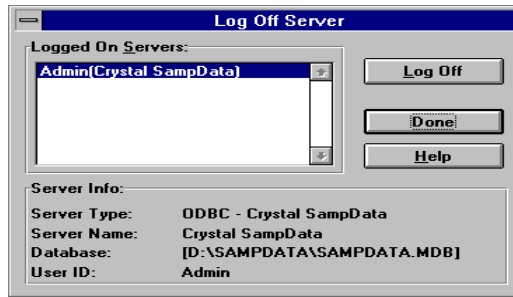


Figure 6-2. Log Off Server dialog

Use the Log Off Server command to log off of an active SQL database.

Using Log Off Server

Follow the procedure below to use Log Off Server.

- | Step | Action |
|------|---|
| 1. | Select Database/Log Off Server . |
| | Response: The Log Off Server dialog box appears. The Opened SQL Servers box lists the SQL servers that are currently activated. |
| 2. | Select the server from which you want to log off and click the Log Off button. |
| | Response: The program logs you off the selected SQL server. |
| 3. | If you want to log off additional servers, repeat Step 2 as many times as necessary. |
| 4. | Click OK when finished and the program returns you to the Crystal Reports Window (or the Design window if you were in the Design window when you chose the Database/Log Off Server command). |

Show SQL Query (Q)

Use the Show SQL Query command to view the SQL query Crystal Reports sends to your SQL server.

Using SQL Query

Follow the procedure below to use Show SQL Query.

Step	Action
------	--------

- | | |
|----|--|
| 1. | Click Database/Show SQL Query . |
|----|--|

Response: The Show SQL Query dialog box appears:

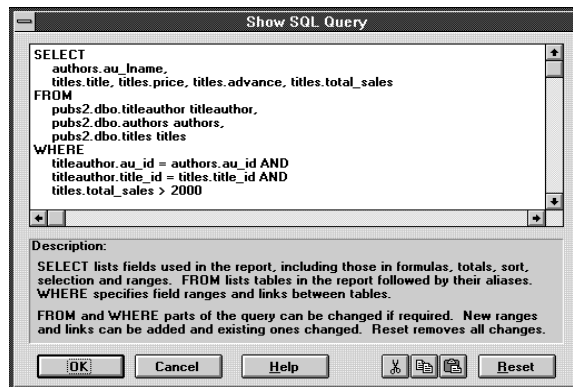


Figure 6-3. Show SQL Query dialog

The Show SQL Query dialog box displays the SQL query Crystal Reports is sending to your SQL server and allows you to edit that query. The query is displayed in three parts:

- **Select.** Select lists all of the fields used in the report, including fields used in formulas, totals, the sort order, the selection formula, and ranges. For example:

```
SELECT
    DIV_INFO.DIVISION_ID, DIV_INFO.DIVISION_NAME,
    DEP_INFO.DEPARTMENT_ID, DEP_INFO.DEPARTMENT_NAME
```

shows that the report is using the DIVISION_ID, DIVISION_NAME, DEPARTMENT_ID, and DEPARTMENT_NAME fields.

- **From.** From lists all the tables used in the report, and each table name is followed by an alias name. For example,

```
FROM
  SYSADM.DIV_INFO DIV_INFO,
  SYSADM.DEP_INFO DEP_INFO
```

shows that the report is using the DIV_INFO and DEP_INFO tables from the SYSADM database, and in each case, the alias name is the same as the table name.

- **Where.** Where specifies any links between tables and field ranges for the report. For example

```
WHERE
  ION_ID=DEP_INFO.DIVISION_ID
```

shows that the DIV_INFO and DEP_INFO tables are linked via the DIVISION_ID fields.

- **Order By.** Order By sorts the data in alphabetic or numeric ascending or descending order. This is useful to display data differently than the default sort order of the database. For example

```
ORDER BY
  DIV_INFO.DIVISION_ID ASC
```


sorts the records in ascending order by the values that appear in the DIV_INFO.DIVISION_ID field.

2. Click the OK button when you're finished viewing the query.

Editing the query

When you are using a SQL data source and you use the **Report/Select Records** command, Crystal Reports automatically generates a query to send to your server. Crystal Reports Professional enables you to edit this query.

If you want to edit the query for performance reasons, or if you want to create a more complex query than you can create using Select Records, you can edit the From and Where parts of the query via the Show SQL Query dialog box.

 *You can also build queries using the **Report/Edit Record Selection Formula** command. If those queries get too complex, however, you may have to edit the queries the program generates.*

To edit the query you can delete, type over, or append to existing text. While all of these capabilities are available to you, you will achieve the best results if you follow these suggestions:

1. Edit the query as much as you can via the **Report/Select Records** command.
2. Then, if the query doesn't meet your needs, append your changes to the end of the query if possible. If you append your changes, the program will remember them.

If you return to Select Records and make additional changes, the program will generate a new query based on the changes you made in Select Records. It will then append your original changes to the new query it generates.

Notes:

- If you overwrite the query, you also overwrite the existing selection formula in the report. Your modified SQL query remains but the selection formula in the report reverts to blank. If you then use Select Records to modify your SQL query, the new query the program generates will overwrite the changes you made earlier in the Show SQL Query dialog box. You will, of course, be given the option to cancel the changes and avoid the overwrite.
- If you plan to override links in the SQL query, leave them defined in the report anyway. The program has to know about all of the tables that are to be used in the report so it can pass all sets of fields to the query. If all of the fields are passed and you then change the links via this dialog box, the program will use the links the way you've defined them in the query.

How SQL Queries are Handled

Crystal Reports is a two-pass report writer. When you use SQL data for your reports, the program off-loads as much of the first pass as possible to the SQL server to reduce processing time and network traffic. The following table shows which part of the first pass are pushed down to your SQL Server and which parts are being handled by Crystal Reports itself.

Design Process	Handled by
Selecting tables for the report	SQL Server
Selecting fields from the tables	SQL Server
Alias naming	SQL Server
Linking fields between tables	SQL Server
Grouping-Sorting records to be grouped	SQL Server
Grouping-Grouping sorted records	Crystal Reports
Sorting records	SQL Server
Sorting groups	Crystal Reports
Selecting records	SQL Server
Selecting Groups	Crystal Reports

The following section describes in more detail how tasks off-loaded to the SQL Server appear in the SQL query generated by Crystal Reports.

Selecting tables and fields

Selecting the tables and fields to be included in your report is the most basic function of generating the report. Gathering large amounts of data, however, can be time consuming and require a large number of system resources. To speed up the task and free up your workstation, Crystal Reports off-loads this process to your SQL Server with code similar to the following:

```
SELECT
    table1.field1, table1.field2,
    table2.fieldx, table2.fieldy
FROM
    database.table1 table1,
    database.table2 table2
```

The SELECT clause indicates which fields are required, while the FROM clause indicate which tables in the SQL database are to be used.

Alias naming

The SQL query declares alias names in the FROM section of the query:

```
FROM
    databasename.table1 myalias
```

Note how this affects the rest of the SQL query in the following code:

```
SELECT
    myalias.field1, myalias.field2,
    table2.fieldx
FROM
    database.table1 myalias,
    database.table2 table2
WHERE
    myalias.field1 = table2.fieldy
```

The alias name for *Table 1* is used in the query in place of the table name itself.

Linking fields between tables

Linking tables with fields that contain the same or similar data is also handled by the SQL query. The following example links three tables in a SQL database:

```
SELECT
    orders.ordernum, orders.orderamount,
    detail.ordernum, detail.customernum
    customer.customernum, customer.name
FROM
    database.orders orders,
    database.detail detail,
    database.customer customer
WHERE
    orders.ordernum = detail.ordernum AND
    customer.customernum = detail.customernum
```

Information that follows the WHERE clause sets conditions on how information in the tables is retrieved. In this case, fields are linked between tables to assure that information drawn from one table matches information drawn from another.

Grouping/summarizing records

Crystal Reports requires two steps to group or summarize records: sorting the records and grouping the records once they've been sorted. Each task is handled separately so that it can be taken care of quickly and efficiently by the tool best suited for the task.

Sorting records is a process easily handled by your SQL Server. For this reason, Crystal Reports dumps the first half of the grouping process to the Server. The Server quickly sorts the records and returns the sort results to Crystal Reports.

Once records are sorted, CRW can quickly group the sorted information before displaying the final report. For this reason, you will never see anything in your SQL queries corresponding to the grouping process. If you have created a group in your report using **Insert/Group Section**, **Insert/Summary**, or **Insert/Subtotal**, your SQL query will contain code that sorts the records for that group, but it will not contain code that groups the records. For example, if your report groups records by the value of the *state* field in the table *mytable*, you will see code similar to the following in your SQL query:

```
SELECT
    mytable.state
FROM
    database.mytable mytable
ORDER BY
    mytable.state
```

The code *ORDER BY mytable.state* sorts the values in the state field but does not group them. When the SQL Server is finished sorting the records, they are returned to Crystal Reports where they are actually grouped.

Sorting

Records

Crystal Reports uses the following code to have your SQL Server sort records:

```
SELECT
    atable.state
FROM
    database.atable
ORDER BY
    atable.state
```

The ORDER BY clause sorts the data in a particular field.

Groups

Your Crystal Reports does not off-load group sorting to the SQL Server. Crystal Reports handles this task itself. You will not see any code in your SQL query to sort groups in your report.

Selection queries

Selecting records

As the SQL Server selects which tables to include in your report and which fields to include from those tables, it can also select which records are included. If your report includes a record selection formula, Crystal Reports will add information to the SQL query to indicate which records are to be included. For example, if your record selection formula (as it appears in the Formula Editor) looks like this:

```
{atable.state} = "CA"
```

your SQL query will look like this:

```
SELECT
...
FROM
...
WHERE
    atable.state = 'CA'
```

Selecting records with “Like”

When the *Like* function is used to select records to be included in your report, Crystal Reports translates the *Like* function into a SQL LIKE clause. For example, if your record selection formula looks like this:


```
{atable.name} like "Smith?*"
```

your SQL query will look like this:

```
SELECT
...
FROM
...
WHERE
    atable.name LIKE 'Smith_%'
```


Selecting groups

Crystal Reports must select groups according to any Group Selection formulas. Since grouping is handled by Crystal Reports during the second pass, selecting groups must also be handled by Crystal Reports. Your SQL queries will never reflect any Group Selection formulas in your reports.

 *For more information regarding the SQL language, refer to the documentation that was provided with your SQL Server.*

Setting SQL Defaults


Crystal Reports enables you to speed up the SQL table selection process by setting SQL defaults via the File|Options command. Once your defaults are set, you can bypass one or more dialog boxes on the way to selecting a SQL table for use in a report. You have the following options available to you:

- **Server Type scroll box**

Use the Server Type scroll box to preselect a server type. Use the scroll arrow and select a server from the scroll list. If you want to log onto that server, all you have to do is click OK, or press enter.

- **Skip Server Type dialog**

This checkbox is a toggle. When you toggle the check mark on, Crystal Reports will bypass the Log On Server dialog box altogether. By default, the checkbox is toggled on.

 *When you bypass the Log On Server dialog box, you no longer have the option to activate a non-SQL database for the report, or to activate a server other than the default server. Activate this option only if you plan to create all of your reports from a single server.*

- **Server Name edit box**

Use this box to enter the name of the SQL server you want to log on to.

- **Database edit box**

Use this box to enter the name of the database you want to activate in the specified SQL server.

- **User ID edit box**

Use this box to enter the name you use to log on to the specified server.

- **Dict Path edit box**

When using Netware SQL, use this box to enter the path for the data dictionary.

- **Data Path edit box**

When using Netware SQL, use this box to enter the path for the data files. Enter the requested login information and click OK when finished. Crystal Reports logs you onto the specified server and takes you to the Choose SQL Table dialog box.

- **Allow Reporting On**

Use the options in this section to select the data you want to allow reporting on. The six reporting options are activated by checkbox toggle switches.

- **Tables**

When you toggle the check mark on, the program will report on user base tables. By default, the Tables checkbox is toggled on.

- **Views**

When you toggle the check mark on, the program will report on virtual tables. By default, the Views checkbox is toggled on.

- **System Tables**

When you toggle the check mark on, the program will report on system tables. These tables are typically used by the system administrator only but are available for use if you have the appropriate permissions. By default, the System Tables checkbox is toggled off.

- **Synonyms**

When you toggle the check mark on, the report will allow reporting on virtual tables that are available on some hosts. By default, the Synonyms checkbox is toggled off.

- **Stored Procedures**

When you toggle the checkmark on, the program will allow reporting on the result sets from stored procedures if you are using SQL systems that support stored procedures.

- **Prompt On Every Table**

When you toggle the check mark on, the program will display the Allow Report On dialog box before it displays the Choose SQL Table dialog box. The Allow Reporting On dialog box enables you to specify the kinds of data you want to appear in the Choose SQL Table dialog box. All of the “Allow Reporting On” options from the SQL tab appear in the Allow Reporting On dialog box.

- **Table name Like**

This option enables you to use the SQL LIKE function to specify the kinds of table names you want to appear in the Choose SQL Table dialog box. You can use the underscore character (_) or the percent sign character (%) as wildcards with this function. The underscore character specifies any single character while the percent sign signifies any character string. For example, DAV_ matches DAVE only, while DAV% matches DAVE and DAVID.

Table name Like C% would display only those tables that have a table name beginning with the letter C (state.Companies but not company.Employee).

- **Owner Like**

This option works exactly like Table name Like except you use the LIKE function to select the Owner (or Creator or Alias) of the table, not the table name itself. For example **Owner Like C%** would display only those tables that had an owner beginning with the letter C (company.Employee but not state.Companies).

Set the SQL options that best fit the way you work.

Product Support

Crystal Reports is a very powerful report writer for the Windows environment. Crystal Services is proud of the quality of the product and has spent a great deal of time trying to make it intuitive to use. If, however, there is something you can't figure out how to do, we suggest you consult the extensive Crystal Reports on-line Help System. The Help System can be accessed by *Clicking* on any Help Button, by depressing the F1 key, or by choosing help from the main Crystal Reports menu. The help system contains most of the information from your User's Guide and includes numerous examples. If you still cannot find an answer to your question, we suggest you consult your User's Guide. That guide includes an extensive index to help you find the topic of interest. Should you have questions that cannot be answered through the use of help or the users Guide, the following alternatives are available for contacting Crystal Services directly.

Free online bulletin board support

Crystal has been supporting Crystal Reports and its predecessor products for many years. In the process, it has developed a number of support resources that are available on a free bulletin board system (BBS).

The BBS offers solid support of Crystal Reports for Windows. In addition, the BBS provides easy access to other related information and a direct line to Crystal for various requests you might have.

The power of BBS support is in its ability to accept, via the phone lines, the very files you are seeking support for. You can upload your report definition files (*.RPT) onto the BBS along with the description of your problems. One of our Customer Support Reps will address the problem and send back the solution through the BBS system. your message will be dealt with as quickly as possible. All you need is a modem to get started with this valuable service.

Crystal Bulletin Board (604)681-9516

Document fax back

If you have a fax machine, you can get technical and marketing documents from Crystal Services by calling (604)681-3450. Listen to the menu, select the documents you would like to receive, and enter your fax number. Crystal Services will fax the documents to you automatically.

Crystal Document FAX Back (604) 681-3450

FAX support - FREE

Another efficient way to receive support on Crystal Reports is to FAX in your technical support request. To do this, first fill in the bottom part of the Technical Support Request form in the product. This form appears when you select Help|Technical Support Request from the Crystal Reports menu. When you have completed the form, click the Print button to print it.

FAX the completed form to us 24 hours a day, Monday through Saturday. After Crystal Support has had a chance to review your FAX, one of our support representatives will respond to you by return FAX.

Crystal FAX Support (604) 681-7163

Mail-in support - FREE

If you would prefer, you can also contact us by mail with written questions or comments, and we will respond by return mail.

If you believe that your questions are such that we should review all of your related files (such as databases, etc.) to help solve your problem, then copy all of the related files and the Crystal Reports Report file (FILENAME.RPT) onto a diskette of any PC compatible format and send it to us. We will investigate the problem and mail back a response to you as soon as possible with your original diskette. Our mailing address is:

Crystal Services
4th Floor - 1095 West Pender Street
Vancouver, BC, Canada V6E 2M6

Telephone support

Registered users of Crystal Reports are entitled to free telephone support (subject to availability) for 60 days from the time of their purchase. Crystal telephone support is available from 8 to 5, P.S.T. Before you call technical support, make sure you have done the following:

- Check the manual
- Check help.

Please have the following information available:

- Serial number
- Product name and version number
- Operating system you are using, i.e. Windows 95 or Windows 3.1 and whether you have a 16-bit or 32-bit version of Crystal Reports
- Version of other software (if required) - btrieve, sybase, paradox, etc.
- Technical Support Request form from product
- Network information if you are on a network
- Contents of autoexec.bat and config.sys files
- List of steps necessary to recreate the problem.

Telephone Number (604) 669-8379

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Registration FAX (604) 681-5147

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