Taking Advantage of Crystal Reports

In addition to maps, charts, and graphs, ArcGIS provides two tools for generating reports that are available directly from the ArcMap interface. A generic reporting tool creates simple reports that can be added to a layout and can use group layers. The other choice, Crystal Reports, is an industry standard application that produces sophisticated, presentation-quality reports.

With ArcGIS 8.3, users receive a full stand-alone copy of Crystal Reports 9 from Crystal Decisions. This article shows users how to take advantage of the Crystal Reports wizard that is integrated with ArcMap in ArcGIS ArcView, ArcEditor, and ArcInfo. The wizard minimizes the learning curve for new users by walking them through the report creation process and helps more experienced users generate reports quickly. For stand-alone reports, Crystal Reports supplies extensive sorting and grouping functionality and incorporates formulas and templates that speed report generation.

However, if an appropriate template is not available for the desired report, the formatting options available solely from the wizard are limited. Because ArcGIS comes with a full copy of Crystal Reports, a good strategy is to rough out the report using the wizard from the ArcGIS interface and go directly into Crystal Reports to refine the report.

Overview
This introductory tutorial uses 2000 census data for the United States that comes from an ArcMap project supplied in the sample dataset. Through working through this exercise, the user can learn how to generate a basic report from ArcMap layers, enhance the formatting, and include additional information in Crystal Reports. Before launching Crystal Reports from the ArcMap interface, GIS users unfamiliar with Crystal Reports might benefit from a brief, general introduction to Crystal Reports and some specific information on the functionality that is available through the wizard in ArcMap. See the accompanying article, “Introducing Crystal Reports.”

Goals for the Tutorial
Like a well-composed map, an effective report communicates specific information to a particular audience in an organized fashion. The first step in creating an effective report is determining its purpose and audience. Both factors will influence what data should be included and how it should be organized and displayed. Writing a single sentence description of the report will help identify the data sources and the information that the report should communicate.

This tutorial will generate a report for managers of Trends, Inc., a fictional chain of retail stores. Trends’ best customers are young adults between the ages of 18 and 29. This report will contain census population data for the central region of the United States organized by state.

Now that the purpose and audience for the report have been identified, the next step is to identify the fields that the data for this report will come from and to sketch out the placement of fields and heading the report will contain. Using pencil and paper for this step is sometimes useful, especially when initially using Crystal Reports. A report worksheet call CRWorksheet in Adobe Acrobat’s portable document format (PDF) was included with the sample dataset. If Acrobat Reader is not available, it can be downloaded at no charge from www.adobe.com/products/acrobat/readstep2.html. The worksheet will help organize the report and identify what information is needed for the report.

Setting Up the Project
Visit the ArcUser Online Web site at www.esri.com/arcuser, and download the archive containing the sample dataset for this tutorial. Create a folder for the project called crystal. Unzip the archive into the crystal folder. See Table 1 for information on the items and fields that will be included in each section of the report.

1. Print a copy of CRWorksheet for use during the tutorial. Using the printed copy of the Crystal Reports Worksheet, write a one sentence summary of the purpose of the report as outlined in the previous section next to Report’s Purpose.
2. Under RH, write down the name of the report and trends.bmp, the graphic that will be used in the report header.
3. Under PH, write the headings that will be used for the columns in the report as listed in Table 1.
4. Start ArcMap and open crystal.mxd. Right-click on the Central Region layer and choose Open Attribute Table. Examine the table data to determine which fields contain

<table>
<thead>
<tr>
<th>Area</th>
<th>Function</th>
<th>Items or Fields to Include</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report Header</td>
<td>Put the title and any information that will appear once at the beginning of the report here.</td>
<td>Title: Young Adults in Central Region, Logo: trends.bmp, report date</td>
</tr>
<tr>
<td>(RH)</td>
<td></td>
<td>Column headings: Region, State, Total Population, Young Adult Population</td>
</tr>
<tr>
<td>Page Header</td>
<td>This section contains information that should appear at the top of each page.</td>
<td>Fields: SUB_REGION, STATE_NAME, POP2000, AGE_18_29</td>
</tr>
<tr>
<td>(PH)</td>
<td></td>
<td>Graphics: crystalmap.map</td>
</tr>
<tr>
<td>Details</td>
<td>The bulk of the report goes here. Each field in this section is printed once per record.</td>
<td></td>
</tr>
<tr>
<td>Report Footer</td>
<td>Items that appear only once at the end of the report (e.g., grand totals, charts) go here.</td>
<td>Footer info: ESRI logo, copyright.txt</td>
</tr>
<tr>
<td>(RF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Page Footer</td>
<td>Page numbers and other items that appear at the bottom of each page can be added here.</td>
<td></td>
</tr>
<tr>
<td>(PF)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 1: Design tab headers and fields*
Crystal Reports provides two ways of working with a report under construction: the Design tab and the Preview tab. The same formatting options are available on both tabs, and changes in one view will update the other. Toggling between the two allows users to iteratively refine a report.

The Design tab lets the user work with a virtual report. Instead of showing actual data, it uses representations of the data—frames that show the size, shape, and placements of the fields that will appear in the report. During the design process, fields are placed in one of five sections or headers. Table 1 lists the five main areas on the Design tab, describes the function of each, and lists the items or fields from the sample data that will be placed in each area of the sample report.

If the report includes a group, summary, or subtotal, two additional sections are added—the Group Header and the Group Footer. The Group Header holds the group name field and appears only once at the beginning of the group. The Group Footer holds summary data for a group and appears once at the end of a group.

The Preview tab lets the user view the report as it will appear when printed. When Preview is initially chosen, Crystal Reports retrieves data from the data sources, performs any necessary calculations, and displays the data in the report format. If changes are made to the underlying data or formulas, the Preview should be refreshed so Crystal Reports will use an updated version of the data. On the Preview tab, two views are available—the Standard Preview and the Group Tree View. The Standard Preview displays the data in the report. The Group Tree View supplies a high-level look at the report that is useful for navigating and visualizing large reports.

Fields are the building blocks of a report. On the Design tab, the object frame for a field shows its location, the data type (i.e., XXX for text fields, $55,555 for currency fields), field width by number of characters displayed, and the size and font currently selected. Actual data from the selected data sources is displayed as formatted in the report when it is viewed on the Preview tab. Adding related database fields, such as first and last names, as text objects instead of separate fields ensures that formatting is consistent and eliminates white space between the fields by trimming the fields.

Summary information associates information on the report’s author, title, keywords, comments, subject, and any template used in the report. Subtotals, grand totals, and summaries are added as summary data that may relate to the entire report or just a grouping.
5. The next section allows records to be suppressed based on a filter applied to the data. A filter is an expression that applies a condition to the data in a field so specific records are selected in much the same way that features are selected by attribute in ArcMap. The records for all states in the region will be included so a filter is not needed. Click Next.

6. In the next pane, type the report title from the RH section of the worksheet next to Title Report. Highlight Table for the report style and click Next.

7. In the final pane, click the radio button next to Edit With Crystal Reports Designer and click Finish. This will save the report using the title typed in the last pane and start Crystal Reports so further refinements can be made to the report that cannot be done in the wizard.

Reviewing and Refining the Report

Other items such as page headings, logos, and copyright text for the page footer will be added using Crystal Reports 9. The report is initially displayed in Design view, which indicates the type, approximate location, number of characters in each field, and the section in which each field is located. Before making adjustments, use the Preview tab to check the report’s appearance.

Report Header

1. Choose File > Print Preview from the menu. Crystal Reports accesses the actual data for the report and displays it on the Preview tab. After noting the location of the fields, click on the Design tab.

2. Right-click on the gray border for the RH section and choose Don’t Suppress from the context menu. Right-click on the title and choose Format Field from the context menu. Click on the Font tab and change the color to gray. Click on the Border tab and under Line Style, change Bottom to single. Under Color, change Border to Gray. Click OK.

3. Place the cursor over the title and drag it into the RH section and to the left so that it lines up with the frame on the left side of the first column. Choose Insert > Picture and navigate to the crystal folder to choose trends.bmp. Drag the image to the right of the report.

4. Choose Insert > Text Object. A text box appears. Move it directly under the report title and click once. A text cursor appears in the text object. Type Report date: in the text box and click. Click outside the RH section to see the text displayed. Drag the Data Date object from the PH section to the RH section and position it next to the Report date: text object. Save the report.

Page Header

1. Right-click on SUB_REGION in the PH section and choose Edit Text from the context menu. Select the existing text and type Region, the first heading on the worksheet. Click outside the text box.

2. Right-click on the heading again and choose Format Text. Click on the Font tab and change the font to Arial Black and the size to 12 points. Click on the Paragraph tab and change Horizontal Alignment to Centered. Click OK. Drag the bottom handle on the text box to make it larger. Click outside the text box.

3. Repeat the process for the other three column headings. Drag the Total Population heading so it begins under the 4.5 inch mark on the ruler. Drag the Young Adults heading under the 6 inch mark. The Details fields will be adjusted to align with the headings next. Save the report.

Details

1. Right-click on the first field in the Details section under the Region subheading.
The report is initially displayed in Design view, which indicates the type, approximate location, number of characters in each field, and the section in which each field is located.

Before making adjustments, use the Preview tab to check the report’s appearance.

Right-click on text objects in the report to modify the text and format of titles and fields in the report.

Adjust the location and formatting of objects in the report. Add lines and background color to emphasize the figures for the Young Adult population.

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Choose Format Field. Use the same procedure used to format the PH section text to change the font size to 12 points. Click OK. Reformat the STATE_NAME field in the same fashion.

2. Select the POP2000 field and drag it under the Total Population heading. Use the Format Field dialog box to change the font size to 12. Click on the Number tab and change the format to (1,123) to add a comma and remove the zeroes. Click on the Common tab and change the alignment to Right. Click OK.

3. Select the AGE_18_29 field and drag it under the Young Adult heading. Use the Format Field dialog box to change the font size to 12. Click on the Number tab and change the format to (1,123) to add a comma and remove the zeroes. Click on the Common tab and change the alignment to Right. Click on the Border tab and change the Line style to Double for Left, Dashed for Right. Under Color, choose Gray for Border. Check the box for Background: and choose Silver for the background color. Click OK. Drag out the object box to make it large enough to display the reformatted numbers.

4. Right-click on each of the vertical lines that separate the columns, choose Format Line, and check the Suppress box. Right-click on the bounding box surrounding all the Details fields, choose Format Box, and check the Suppress box. If desired, use the suppress option to eliminate the lines between each field. Save the report.

**Report Footer**

1. Right-click on the gray border for the RF section and choose Don’t Suppress from the context menu. Click on the Design tab and adjust the size of the report sections so that there is a little space between the Details section and the RF section and there is a vertical four-inch space in the RH section.

2. Choose Insert > Picture, navigate to the crystal folder, and choose crystalmap.bmp. Position it in the center of the RH section. Choose Insert > Text Object, and use the process described in the Report Header section to add the title Most Promising States. Change the font to Arial Black and the size to 14 points. Save the report.

**Page Footer**

1. Choose Insert > Line and use the line drawing tool to make a line at the top of the Page Footer section.

2. Choose Insert > Picture and locate the corporateproductlogo.bmp. Use the frame handles to scale the image if necessary.


**Additional Resources**

This tutorial supplies a basic understanding of how Crystal Reports works with ArcGIS. Explore the additional functionality furnished by this product by reading the user guide in PDF format that is included on the installation CD-ROM. Using the Design tab to examine the sample reports that ship with Crystal Reports will suggest more ways to use the tools in Crystal Reports. These samples are located in the program’s installation directory. Several scripts and samples are also available from the ArcScripts Web site (www.esri.com/scripts), including MyReports, a tool that lets the user launch custom reports from ArcGIS.