
BIRT
A Field Guide
Third Edition

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Application development tools and technology have come a long way since the late 1970s, when I took my first job out of college in Hewlett-Packard Company's IT (Information Technology) department. Of course, IT was not the term we used to refer to the discipline back then; our preferred acronym was EDP (Electronic Data Processing).

And maybe that difference between simply "processing" data and delivering "information" was reflected in our development tools. We worked on TTY terminals connected to 16-bit mini-computers over 2400 baud lines. We used simple line editors to make changes to our COBOL programs, and we kept our application data in non-relational hierarchical databases. Debugging was COBOL WRITE statements, and source code control was keeping full copies of every version on tape or in separate directories.

Reports for our applications were typically afterthoughts, and they were done by hand in the same technology we used to develop the base application, i.e., COBOL. We designed them—when we did design—by laying them out in pencil on the report design pads that IBM had developed for RPG and COBOL programmers. Because we created them without much forethought, and because junior programmers like me often got the assignment of coding them, our users often found them inadequate, and the cost of making changes to accommodate their true requirements was high.

But while today's application developer may scratch his or her head in wonder at the primitive tools and technologies we employed in building our base applications in the late 1970s, he or she may not find my description of our approach to report development so very unfamiliar.

JSP = COBOL and Banded Report Writers = Report Design Pads

The majority of Java developers still hand-code reports for their applications using JavaServer Page (JSP) technology. This is analogous to our approach of hand-coding them in COBOL and has all the same downsides: high development cost, low user satisfaction, and inflexible, high-cost maintenance.

A minority of Java developers do use tools to develop reports; however, almost all of these tools—be they commercial or open source—are what's

known as “banded report writers,” and they support a design metaphor that has essentially evolved from the old IBM report pads. Each section in the report writer—header, detail, footer—corresponds to a section in the report with the detail sections repeating as needed to accommodate rows from the data source.

Because they were created before the advent of the internet, banded report writers are not intuitive to web application developers, who are most comfortable with the web page-oriented design metaphor that one finds in modern graphical web development tools. In addition, web concepts—such as tables, graphical object containment and inheritance, cascading style sheets (CSS), and scripting in web-oriented languages like Java and JavaScript—are not supported.

Enter BIRT

The Eclipse Foundation’s Business Intelligence and Reporting Tools (BIRT) project takes report development into the age of the internet. Based on industry-leading Eclipse IDE and Rich Client Platform (RCP) technology, BIRT was built from the ground up for web applications.

As Senior Vice President of Engineering for Actuate Corporation, I’m proud of the leading role my company has played in the project. We’ve leveraged our 16+ years of experience in the reporting and business intelligence space and put to work a significant number of full-time developers (or “committers,” in Eclipse Foundation parlance) on the development of the platform. In fact, Ohloh, the open-source rating website, calculates that it would cost over \$21M to hire a team to write the project from scratch. But more important than the investment is the result: BIRT is an extensible, full-featured reporting platform that is ready for use in and integration with production applications.

An impressive list of commercial adopters justifies this claim. BIRT is used extensively in IBM’s Rational and Tivoli product lines, in Borland’s Silk and Together product lines, in the Sybase IQ analytics server, in the Zend Platform to enable reporting in PHP, and by SPSS.

Likewise, enterprise IT developers and system integrators have embraced BIRT and are using it in important business applications. In fact, a survey done by an independent market research firm found that BIRT is used by about 1,000,000 developers worldwide.

All of these constituencies—ISVs, IT, and SI developers—contribute to the Eclipse Foundation BIRT community, which is a vibrant one. The BIRT newsgroup is especially active and BIRT is one of the most searched-for terms on the Eclipse website. Feedback from the community has helped to drive project priorities, give direction on feature implementation, uncover defects, and once in a while, deliver some “attaboys” to the project team. Here are just a few comments posted by developers in the Eclipse BIRT newsgroup:

"I had installed BIRT the other day just to check it out and barely went through the introductory tutorial. Today I was able to drag and drop my way to replacing a broken report (600 lines of somebody else's perl) and all I can really say is it was almost too easy."

"I've gotten through what I think is a complex development and I'm impressed with exactly how much BIRT can do."

"BIRT is an inspiring piece of work that I chose over Crystal Reports."

"I find BIRT much easier to use and customize than JasperReports/iReport."

"I think BIRT is one of the best reporting tools today."

"Lots of credit to the BIRT crosstab team. The crosstab feature looks great."

"I will recommend BIRT and its community for other people."

"We love BIRT."

I hope that you will leverage the information in this book to become a successful member of the BIRT community as well. And, in the off chance that you are standing in a bookstore aisle, having picked up this book with no idea what BIRT is all about, may I suggest that you rush home—after buying the book, of course—and download the software from the Eclipse BIRT website:

<http://www.eclipse.org/birt>

Take it from me—it's the best way to prevent yourself from being lumped into the same category as 1970s COBOL programmers!

Mark Coggins
Senior Vice President of Engineering, Actuate Corporation

About this book

BIRT is a powerful reporting platform that provides end-to-end reporting solutions, from creating and deploying reports to integrating report capabilities into other enterprise applications. Two companion books, *BIRT: A Field Guide* and *Integrating and Extending BIRT*, cover the breadth and depth of BIRT's functionality.

Using BIRT Report Designer's rich set of tools, report developers can create many reports, simple and sophisticated, without programming. This book teaches report developers how to create reports using the graphical tools of BIRT Report Designer. Report developers who want to go beyond the graphical tools to customize the report-generation process or incorporate complex business logic in their reports should read the second book, *Integrating and Extending BIRT*.

This third edition, newly revised for BIRT 2.6, adds updated examples and covers all the new features in cross tabs, charts, page management, and data sharing.

Who should read this book

This book is intended for people who have a basic need for reporting and data presentation. You need not be an expert at creating reports nor do you need years of programming experience. Familiarity with the following subjects, however, is useful:

- HTML, for formatting report content
- SQL, for writing basic queries to extract data from a database for a report
- JavaScript, for writing basic expressions to manipulate data in the report

This book provides many examples of formatting with HTML, and writing SQL queries and JavaScript expressions, but it is not designed to teach you HTML, SQL, or JavaScript.

Contents of this book

This book is divided into several parts. The following sections describe the contents of each of the parts.

Part I, Installing BIRT

Part I introduces the currently available BIRT reporting packages, other components, and the steps to install and update the packages. Part I includes the following chapters:

- *Chapter 1, Introducing BIRT Report Designers.* BIRT provides a number of separate packages for BIRT Report Designer as downloadable archive (.zip) files on the Eclipse web site. This chapter describes the components that make up each of the available report designer packages and additional packages that enhance the designer technology and environment.
- *Chapter 2, Installing a BIRT Report Designer.* BIRT provides two report designers as separate packages, which are downloadable archive (.zip) files on the Eclipse web site. This chapter describes the steps required to install and update each of the available report designers. The chapter also shows how to troubleshoot installation problems and install a language pack that provides localization support.

Part II, Getting Started

Part II provides an overview of the report creation process and introduces the report design environment. Part II includes the following chapters:

- *Chapter 3, Learning the Basics.* This chapter presents fundamental concepts of reporting and provides a tutorial. Report developers learn that the report design process begins with a paper and pencil sketch of the proposed report layout and continues through specifying data, laying out the report, formatting, previewing, and testing. In addition, this chapter orients the reader to the software. To accomplish that objective, the chapter provides a tutorial that walks the reader through a creation of a complete report.
- *Chapter 4, Planning Your Report.* This chapter explains the planning process in greater detail. Planning is essential to creating effective and efficient reports. A thorough understanding of user requirements and objectives makes the development process smoother and achieves better results. This chapter discusses the types of requirements and other information that a report developer should consider when determining how to set up, format, and distribute a report.

Part III, Accessing and Binding Data

Part III discusses the tasks necessary to connect to an external data source, extract, and prepare data for use in a report. Part III includes the following chapters:

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- *Chapter 5, Connecting to a Data Source.* Report data comes from many different information systems. An important step in developing a report is ensuring you can connect to a system that provides data. This chapter explains how to access data in JDBC databases, text files, XML documents, and web services.
 - *Chapter 6, Retrieving Data.* Data sources typically contain more data than is needed in an effective report. This chapter explains how to define data sets to retrieve only the data required for a report. Specifically, this chapter describes retrieving data from JDBC databases, text files, XML sources, and web services.
 - *Chapter 7, Binding Data.* The data sets you create retrieve the data you want to use in a report. Before you can use or display this data in a report, you must first create the necessary data bindings. A data binding defines an expression that specifies what data to display. This chapter explains how to create and manage data bindings.

Part IV, Designing Reports

Part IV describes the tasks that a report developer completes to design reports using BIRT Report Designer. Part IV includes the following chapters:

- *Chapter 8, Laying Out a Report.* A report developer places and arranges report data on a page to determine how report users view the information. This chapter provides an overview of the layout model and describes the report elements that BIRT Report Designer provides for organizing and displaying data. This chapter also describes techniques for creating report sections and placing report elements.
- *Chapter 9, Displaying Text.* Much of the information in any report is textual. Textual information can be static text or values derived from data set fields. Text can be as short as a single word, or span paragraphs or pages. This chapter describes the different types of textual elements that BIRT Report Designer provides, and how to use each type of element.
- *Chapter 10, Formatting Report Content.* Formatting different types of data within a report improves the clarity and visual appeal of the report. This chapter describes many formatting techniques, including how to change the display of dates, numbers, or currency values, format report elements based on conditions, and adjust the spacing between report elements.
- *Chapter 11, Sorting and Grouping Data.* Almost all reports require that a report developer structure the data that comes into the report. Grouping and sorting are two ways of structuring data to ensure that the critical relationships among various pieces of information in a report are apparent to the report user. For example, a report developer can use grouping and sorting with sales data to organize the data by region, then by office, and finally by sales representatives. This chapter also includes a tutorial.
- *Chapter 12, Aggregating Data.* One of the key features of any report is the ability to display summary, or aggregate, information. For example, a

sales report can show the overall sales total, sales subtotals by product type, region, or sales representative, average sales amount, or the highest or lowest sales amounts. This chapter describes the common types of aggregate calculations, and explains how to write aggregate expressions and where to place them in a report.

- *Chapter 13, Writing Expressions.* To obtain the necessary data for a report, it is often necessary to use expressions to manipulate the raw data that comes from a data source. This chapter explains how to write JavaScript expressions and provides many examples of manipulating data, including how to convert numbers to strings, combine values from multiple data set fields, search and replace string values, get parts of a string, and calculate the time between two dates.
- *Chapter 14, Filtering Data.* Often the data from a data set includes information that is not relevant in a particular report. To exclude this extraneous information from the report, a report developer filters the data to use only the data that pertains to the report. This chapter discusses how to use BIRT Report Designer to filter data and how to enable filtering in the external data set.
- *Chapter 15, Enabling the User to Filter Data.* A report developer can use parameters to enable report users to determine which part of the data they see in the report. For example, in a report of nationwide sales figures, filtering can be used to display the data for a user-specified region. This chapter shows how to set up a report that enables a user to specify parameter values to determine what data appears in a report. This chapter also shows how to design report parameters to improve their usability and presentation.
- *Chapter 16, Building a Report That Contains Subreports.* This chapter provides examples of building and organizing subreports in a report. This chapter also includes a tutorial that provides an example of a master-detail report. This tutorial illustrates and reviews many of the topics from earlier chapters. A reader can complete the tutorial and practice applying the basic principles to build a more complex report that includes both side-by-side subreports and data set parameters.
- *Chapter 17, Using a Chart.* The graphical presentation of summary data is another way of improving the effectiveness of a report. A chart can serve as a report in itself or provide a synopsis of more complex data that appears in a report. Charts often provide an additional view of the data, highlighting or extending the information that appears in a report. This chapter introduces the types of charts that a developer can create and discusses the steps that are required to add a chart to a report. The chapter includes a tutorial that introduces a reader to the chart features.
- *Chapter 18, Displaying Data in Charts.* Setting up chart data differs somewhat from selecting typical report data and requires some specific knowledge about how to process data to produce effective charts. To modify which data appears and the arrangement of the data in the chart, you must use series, grouping, and axis settings. This chapter discusses

how to link data to a chart, use the chart builder to filter data, plot the data by defining *x*- and *y*-axes, and sort and group data. You also learn how to create a combination chart and a meter chart.

- *Chapter 19, Laying Out and Formatting a Chart.* Like chart data, the steps to lay out and format a chart are distinct from the layout and formatting options for a typical report. This chapter explains how to work with the visual elements of a chart to produce the desired appearance. The tasks include positioning elements in the chart area, adding and formatting titles and labels, and changing the style of the series elements available in each chart type.
- *Chapter 20, Presenting Data in a Cross Tab.* A cross tab is ideal for presenting summary data in a compact row-and-column matrix that looks similar to a spreadsheet. This chapter explains how to prepare data for a cross tab and how to build a cross tab. The chapter also includes a tutorial that provides an example of building and formatting a cross tab.
- *Chapter 21, Presenting Different Views of the Same Data.* A report is often more effective when it presents key data in both graphical and textual formats. This chapter explains how report elements can share and display the same data, and provides examples for building dashboard reports.

Part V, Enhancing Reports

Part V discusses features you can add to a report to improve usability and increase productivity when working with suites of reports. Part V includes the following chapters:

- *Chapter 22, Designing a Multipage Report.* Most reports display on multiple pages. Often, report developers want to specify where page breaks occur and they want to display information, such as page numbers and report titles, on every page. This chapter explains how to control pagination in a report and how to design a page layout.
- *Chapter 23, Adding Interactive Viewing Features.* To make a report more useful, you can add interactive features, such as hyperlinks or bookmarks. This chapter describes how to create and use bookmarks and tables of contents. It also describes how to add interactive features, such as highlighting and tooltips, to charts.
- *Chapter 24, Building a Shared Development Framework.* To support a consistent appearance for a suite of reports, BIRT provides two ways to share the report development among designers. A report library contains standard report elements, such as data sources, a company logo, or a set of styles. A report template combines report elements from libraries or the BIRT palettes to provide a predefined layout and master page. Report developers who use these tools increase their productivity.
- *Chapter 25, Localizing Text.* To support international data or produce reports that can be viewed in multiple locales or languages requires planning and an understanding of the issues that are associated with

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