



ADOBE® **FLEX® 4**

TRAINING

from the **SOURCE** VOLUME 1

Michael Labriola, Jeff Tapper, and Matthew Boles

Foreword by Matt Chotin, Flex Product Manager



Adobe® Flex® 4

# Training from the Source

Michael Labriola  
Jeff Tapper  
Matthew Boles  
Introduction by Matt Chotin, Flex Product Manager



# Adobe® Flex® 4: Training from the Source

Michael Labriola/Jeff Tapper/Matthew Boles



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*To my wife Laura and my daughter Lilia; you both make me smile.*

*—Michael Labriola*

*My efforts on this book are dedicated to my wife Lisa and children Kaliopé and Kagan. Without you to inspire me, this just wouldn't be possible.*

*—Jeff Tapper*

*To Sandra, my wife, who has made the last 24 years together a joy. And to Scrappy, my furry fishing buddy.*

*—Matthew Boles*

# Bios

**Michael Labriola** is a Founding Partner and Senior Consultant at Digital Primates. He has been developing Internet applications since 1995 and has been working with Flex since its 1.0 beta program. Michael is an Adobe Certified Instructor, Community Professional, Flex Developer Champion, and international speaker on Flex and AIR topics who has consulted for many of the world's most recognized brands.

At Digital Primates, Michael mentors client development teams using emerging technologies. At home, he spends his free time escaping from technology through wine and food.

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Thanks to Jeff, Matt, and Simeon for their work and dedication on this book. Thanks to Chris Gieger for his gratis design work on the FlexGrocer application. A huge thank you to Robyn for her unending patience and diligence. My thanks to Victor and Nancy for their work on our behalf at Peachpit. Thanks to all of the team members at Digital Primates who picked up the slack when this book always took more time than expected. Thanks to my clients for the interesting work and inspiration to keep learning these technologies. And, as always, continuing thanks to Matt for dragging me into this adventure. Most of all, thanks to my wife Laura, who handles everything else without complaint or mention and is the real reason I accomplish anything at all.

—Michael Labriola

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—Jeff Tapper

Thanks to Jeff, Mike, Robyn, and Simeon for the great work getting this book out.

—Matthew Boles

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# Foreword

Ten years ago Macromedia coined the term rich Internet application, or RIA, to describe the modern web application: one where a significant amount of data and business logic live on a server or in the cloud, but where the computing power of the desktop is leveraged to provide a great user experience. Flex has been at the center of the RIA landscape since Macromedia introduced it in 2004 and subsequent releases came under the Adobe name in 2006, after Adobe's acquisition of Macromedia. With the release of Flex 4, Adobe is bringing the power of the RIA to an even broader audience of developers. The book you have in your hand is a great first step in learning to use that power.

Adobe Flex comprises a number of elements. It has a declarative markup language called MXML to help you structure your application, and it uses ActionScript 3.0 (an implementation of ECMAScript) to add all the programming power you need. Your UI can be customized using the familiar CSS syntax. In addition to learning the languages that Flex uses (and when to use each), you'll learn about the powerful component library and the best way to leverage it in your applications. Flex provides layout containers, form controls, formatters and validators, a rich text library, an effects and animation library, and much more to allow you to quickly build your user interface. And when Flex doesn't provide something out of the box, you can easily build it yourself by extending what does exist.

Much of our time in Flex 4 was spent introducing the next generation of the Flex component framework called Spark. Building on top of Flex's existing architecture, Spark provides a much more expressive mechanism for developers and designers to work together on the appearance of their Flex applications. Spark promotes thinking in terms of Model-View-Controller (MVC) and enables the functionality of components to be cleanly separated from their visual appearance and behavior. In addition to simply making Flex applications easier to develop and maintain, this separation also allows for better collaboration between designers and developers, who may not be able to work on the application using the same tools.

Of course it's not enough to have a pretty interface; your application needs to be functional, and often that means manipulating data. You'll find that Flex offers a variety of ways to connect to your backend data sources, from XML over HTTP, to SOAP web services, to an efficient remoting protocol called Action Message Format, or AMF, which is supported by every major backend technology. Flex also offers tight integration with Adobe LiveCycle Data

Services, a powerful offering that makes it easy to manage large sets of data, especially when that data is shared among many users.

While every element of Flex can be coded by hand with your favorite text editor on top of the open source Flex SDK, Adobe Flash Builder 4 is a fantastic IDE built on top of Eclipse that can help build and test a lot of your functionality faster. And as part of Flex 4, Adobe is introducing a new tool, Adobe Flash Catalyst, which allows designers to easily collaborate with developers in creating great user experiences. Additionally, there are a number of third-party tools, libraries, and extensions (some written by your authors!) aimed at making you more productive in your development.

But it's not enough to simply know about the pieces that make up a Flex application. You have to know how to use them well. *Adobe Flex 4: Training from the Source* draws from the expertise of its authors to present a number of lessons that will not only introduce you to the concepts of Flex, but also help you use best practices as you go. With this introduction you'll find yourself quickly building applications that look better and do more than anything you've done before.

You know those applications that you see in the movies that seem so unrealistic? With the power of Flex 4 and its related tools, they may not be that far off! We at Adobe can't wait to see what you build.

Matt Chotin  
Senior Product Manager  
Adobe Systems, Inc.

# Introduction

In March 2002, Macromedia coined the term *rich Internet application*. Back then, the idea felt somewhat futuristic, but all that has changed. Rich Internet applications (RIAs) are today's reality.

Macromedia introduced Flex in 2004 so that developers could write web applications for the nearly ubiquitous Flash platform. These applications benefited from the improved design, usability, and portability that Flex made possible, dramatically changing the user experience. These features are a cornerstone of Web 2.0, a new generation of Internet applications focused on creativity and collaboration.

Since the introduction of Flex, Macromedia—and now Adobe—has released versions 1.5, 2, 3, and 4 of Flex. With each subsequent version, creating rich, compelling, intuitive applications has gotten easier, and the bar has been raised on users' expectations of web applications. Countless organizations have discovered the benefits of Flex and have built and deployed applications that run on the Flash platform.

But Flex 1 and 1.5 were most definitely not mass market products. The pricing, lack of IDE, limited deployment options, and other factors meant that those early versions of Flex were targeted specifically for large and complex applications as well as for sophisticated developers and development. However, with the new releases of the Flex product line, all this has changed.

Flex 2 was released in 2006 and made Flex development a possibility for many more people, as it included a free software development kit (SDK). With the open sourcing of Flex 3, and the announcement of free versions of Flash Builder for students, Flex development is within the grasp of any developer with enough foresight to reach for it. The release of Flex 4 has made it even easier to build rich, efficient, cutting-edge applications. Among the many improvements of Flex 4 is the streamlining of the workflow between designer and developer, greatly easing the process of bringing intuitive, compelling designs to even more Flex applications.

Getting started with Flex is easy. Flex itself is composed of two languages: MXML, an XML-based markup language; and ActionScript, the language of Flash Player. MXML tags are easy to learn (especially when Flash Builder writes them for you). ActionScript has a steeper learning curve, but developers with prior programming and scripting experience will pick it up easily. But there is more to Flex development than MXML and ActionScript.

To be a successful Flex developer, you will need to understand a number of concepts, including the following:

- How Flex applications should be built (and how they should not)
- What the relationships between MXML and ActionScript are, and when to use each
- How to load data into a Flex application
- How to use the Flex components, and how to write your own
- What the performance implications are of the code you write
- Which practices you should employ to write code that is scalable, manageable, and reusable

Developing these skills is where this book comes in. As the authors, we have distilled our hard-earned Flex expertise into a series of lessons that will jump-start your own Flex development. Starting with the basics, and then incrementally introducing additional functionality and know-how, the author team guides your journey into the exciting world of RIAs, ensuring success every step of the way.

Flex is powerful, highly capable, fun, and incredibly addictive. And *Adobe Flex 4: Training from the Source* is the ideal tour guide on your journey to the next generation of application development.

*Adobe Flex 4: Training from the Source* is an update to the popular *Adobe Flex 3: Training from the Source*. It is our sincere intention that readers of the earlier book, as well those who are first exploring Flex with this book, will find this content compelling. Since the release of our previous book, the Flex SDK has been completely reworked. Among the many improvements are:

- Much greater efficiencies at run time from Flex applications
- A new component model that removes a lot of unnecessary code from applications, allowing them to be much smaller
- A greatly improved designer and developer workflow
- And much more

It's an incredible time to be an RIA developer, and we hope that this book provides you with all the tools you need to get started with Flex.

## Prerequisites

To make the most of this book, you should at the very least understand web terminology. This book isn't designed to teach you anything more than Flex, so the better your understanding of the World Wide Web, the better off you'll be. This book is written assuming that you are comfortable working with programming languages and that you are probably working with a server-side language such as Java, .NET, PHP, or ColdFusion. Although knowledge of server-side technologies is not required to succeed with this book, we invoke many comparisons and analogies to server-side web programming. This book is not intended as an introduction to programming or as an introduction to object-oriented programming (OOP). Experience with OOP is not required, although if you have no programming experience at all, you might find the materials too advanced.

## Outline

As you'll soon discover, this book mirrors real-world practices as much as possible. Where certain sections of the book depart from what would be considered a real-world practice, every attempt has been made to inform you. The exercises are designed to get you using the tools and the interface quickly so that you can begin to work on projects of your own with as smooth a transition as possible.

This curriculum should take approximately 28–35 hours to complete and includes the following lessons:

**Lesson 1:** Understanding Rich Internet Applications

**Lesson 2:** Getting Started

**Lesson 3:** Laying Out the Interface

**Lesson 4:** Using Simple Controls

**Lesson 5:** Handling Events

**Lesson 6:** Using Remote XML Data

**Lesson 7:** Creating Classes

**Lesson 8:** Using Data Binding and Collections

**Lesson 9:** Breaking the Application into Components

**Lesson 10:** Using DataGroups and Lists

**Lesson 11:** Creating and Dispatching Events

**Lesson 12:** Using DataGrids and Item Renderers

**Lesson 13:** Using Drag and Drop

**Lesson 14:** Implementing Navigation

**Lesson 15:** Using Formatters and Validators

**Lesson 16:** Customizing a Flex Application with Styles

**Lesson 17:** Customizing a Flex Application with Skins

**Lesson 18:** Creating Custom ActionScript Components

## Who Is This Book For?

All the content of this book should work well for users of Flash Builder on any of its supported platforms.

## The Project Application

*Adobe Flex 4: Training from the Source* includes many comprehensive tutorials designed to show you how to create a complete application using Flex 4. This application is an online grocery store that displays data and images and takes a user through the checkout process, ending just before the data would be submitted to a server.

By the end of the book, you will have built the entire application using Flex. You will begin by learning the fundamentals of Flex and understanding how you can use Flash Builder in developing the application. In the early lessons, you will use Design mode to begin laying out the application, but as you progress through the book and become more comfortable with the languages used by Flex, you will spend more and more time working in Source mode, which gives you the full freedom and flexibility of directly working with code. By the end of the book, you should be fully comfortable working with the Flex languages and may even be able to work without Flash Builder by using the open source Flex SDK and its command-line compiler.

## Errata

Although we have made every effort to create a flawless application and book, occasionally we or our readers find problems. The errata for the book will be posted at [www.flexgrocer.com](http://www.flexgrocer.com).



## Standard Elements in the Book

Each lesson in this book begins by outlining the major focus of the lesson at hand and introducing new features. Learning objectives and the approximate time needed to complete all the exercises are also listed at the beginning of each lesson. The projects are divided into exercises that demonstrate the importance of each skill. Every lesson builds on the concepts and techniques learned in the previous lessons.

▶ **TIP:** An alternative way to perform a task or a suggestion to consider when applying the skills you are learning.

\* **NOTE:** Additional background information to expand your knowledge, or advanced techniques you can explore to further develop your skills.

⚠ **CAUTION!** Information warning you of a situation you might encounter that could cause errors, problems, or unexpected results.

**Boldface text:** Words that appear in **boldface** are terms that you must type while working through the steps in the lessons.

**Boldface code:** Lines of code that appear in **boldface** within code blocks help you easily identify changes in the block to be made in a specific exercise step.

```
<mx:HorizontalList dataProvider="{dp}"
  labelFunction="multiDisplay"
  columnWidth="130"
  width="850"/>
```

**Code in text:** Code or keywords appear slightly different from the rest of the text so you can identify them.

**Code block:** To help you easily identify ActionScript, XML, and HTML code within the book, the code has been styled in a special font that's different from the rest of the text. Single lines of ActionScript code that are longer than the margins of the page are wrapped to the next line. They are designated by an arrow at the beginning of the continuation of a broken line and are indented under the line from which they continue. For example:

```
public function Product (_catID:Number, _prodName:String,
  ➤ _unitID:Number, _cost:Number, _listPrice:Number,
  ➤ _description:String, _isOrganic:Boolean, _isLowFat:Boolean,
  ➤ _imageName:String)
```

**Italicized text:** *Italics* are used to show *emphasis* or to introduce *new vocabulary*.

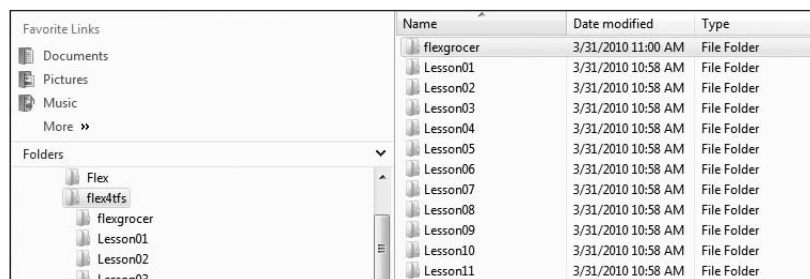
Italics are also used for placeholders, which indicate that a name or entry may change depending on your situation. For example, in the path *driverroot:/flex4tfs/flexgrocer*, you would substitute the actual name of your root drive for the placeholder.

**Menu commands and keyboard shortcuts:** There are often multiple ways to perform the same task in Flash Builder. The different options will be pointed out in each lesson. Menu commands are shown with angle brackets between the menu names and commands: Menu > Command > Subcommand. Keyboard shortcuts are shown with a plus sign between the names of keys to indicate that you should press the keys simultaneously; for example, Shift+Tab means that you should press the Shift and Tab keys at the same time.

**CD-ROM:** The CD-ROM included with this book includes all the media files, starting files, and completed projects for each of the lessons in the book. These files are located in the start and complete directories. Lesson 1, “Understanding Rich Internet Applications,” does not include exercises. If you need to return to the original source material at any point, you can restore the FlexGrocer project. Some lessons include an intermediate directory, which contains files in various stages of development in the lesson. Other lessons may include an independent directory, which is used for small projects intended to illustrate a specific point or exercise without impacting the FlexGrocer project directly.

Anytime you want to reference one of the files being built in a lesson to verify that you are correctly executing the steps in the exercises, you will find the files organized on the CD-ROM under the corresponding lesson. For example, the files for Lesson 4 are located on the CD-ROM in the Lesson04 folder, in a project named FlexGrocer.fxp.

The directory structure of the lessons you will be working with is as follows:



Name	Date modified	Type
flexgrocer	3/31/2010 11:00 AM	File Folder
Lesson01	3/31/2010 10:58 AM	File Folder
Lesson02	3/31/2010 10:58 AM	File Folder
Lesson03	3/31/2010 10:58 AM	File Folder
Lesson04	3/31/2010 10:58 AM	File Folder
Lesson05	3/31/2010 10:58 AM	File Folder
Lesson06	3/31/2010 10:58 AM	File Folder
Lesson07	3/31/2010 10:58 AM	File Folder
Lesson08	3/31/2010 10:58 AM	File Folder
Lesson09	3/31/2010 10:58 AM	File Folder
Lesson10	3/31/2010 10:58 AM	File Folder
Lesson11	3/31/2010 10:58 AM	File Folder

**Directory structure**

## Adobe Training from the Source

The *Adobe Training from the Source* and *Adobe Advanced Training from the Source* series are developed in association with Adobe and reviewed by the product support teams. Ideal for active learners, the books in the *Training from the Source* series offer hands-on instruction designed to provide you with a solid grounding in the program's fundamentals. If you learn best by doing, this is the series for you. Each *Training from the Source* title contains hours of instruction on Adobe software products. They are designed to teach the techniques that you need to create sophisticated professional-level projects. Each book includes a CD-ROM that contains all the files used in the lessons, completed projects for comparison, and more.

## What You Will Learn

You will develop the skills you need to create and maintain your own Flex applications as you work through these lessons.

***By the end of the book, you will be able to:***

- Use Flash Builder to build Flex applications
- Understand MXML, ActionScript 3.0, and the interactions of the two
- Work with complex sets of data
- Load data using XML
- Handle events to allow interactivity in an application
- Create your own event classes
- Create your own components, either in MXML or ActionScript 3.0
- Apply styles and skins to customize the look and feel of an application
- And much more . . .

## Minimum System Requirements

### ***Windows***

- 2 GHz or faster processor
- 1 GB of RAM (2 GB recommended)

- Microsoft Windows XP with Service Pack 3, Windows Vista Ultimate or Enterprise (32 or 64 bit running in 32-bit mode), Windows Server 2008 (32 bit), or Windows 7 (32 or 64 bit running in 32-bit mode)
- 1 GB of available hard-disk space
- Java Virtual Machine (32 bit): IBM JRE 1.5, Sun JRE 1.5, IBM JRE 1.6, or Sun JRE 1.6
- 1024x768 display (1280x800 recommended) with 16-bit video card
- Flash Player 10 or later

### ***Macintosh***

- Intel processor based Mac
- OS X 10.5.6 (Leopard) or 10.6 (Snow Leopard)
- 1 GB of RAM (2 GB recommended)
- 1 GB of available hard-disk space
- Java Virtual Machine (32 bit): JRE 1.5 or 1.6
- 1024x768 display (1280x800 recommended) with 16-bit video card
- Flash Player 10 or later

The Flex line of products is extremely exciting, and we're waiting to be amazed by what you will do with it. With a strong foundation in Flex, you can expand your set of skills quickly. Flex is not difficult to use for anyone with programming experience. With a little bit of initiative and effort, you can fly through the following lessons and be building your own custom applications and sites in no time.

## **Additional Resources**

### **Flex Community Help**

Flex Community Help brings together active Flex users, Adobe product team members, authors, and experts to give you the most useful, relevant, and up-to-date information about Flex.

Whether you're looking for a code sample or an answer to a problem, have a question about the software, or want to share a useful tip or recipe, you'll benefit from Community Help. Search results will show you not only content from Adobe, but also from the community.