Spring Recipes

A Problem-Solution Approach

Gary Mak

Apress®

Spring Recipes: A Problem-Solution Approach

ISBN-13 (pbk): 978-1-59059-979-2

ISBN-10 (pbk): 1-59059-979-9

ISBN-13 (electronic): 978-1-4302-0624-8

ISBN-10 (electronic): 1-4302-0624-1

Printed and bound in the United States of America 9 8 7 6 5 4 3 2 1

Lead Editors: Steve Anglin, Tom Welsh
Technical Reviewers: Sam Brannen, Kris Lander
Editorial Board: Clay Andres, Steve Anglin, Ewan Buckingham, Tony Campbell, Gary Cornell, Jonathan Gennick, Matthew Moodie, Joseph Ottinger, Jeffrey Pepper, Frank Pohlmann, Ben Renow-Clarke, Dominic Shakeshaft, Matt Wade, Tom Welsh
Project Manager: Kylie Johnston
Copy Editor: Damon Larson
Associate Production Director: Kari Brooks-Copony
Production Editor: Laura Esterman
Compositor: Dina Quan
Proofreader: April Eddy
Indexer: Ron Strauss
Artist: April Milne
Cover Designer: Kurt Krames
Manufacturing Director: Tom Debolski

Distributed to the book trade worldwide by Springer-Verlag New York, Inc., 233 Spring Street, 6th Floor, New York, NY 10013. Phone 1-800-SPRINGER, fax 201-348-4505, e-mail `orders-ny@springer-sbm.com`, or visit `http://www.springeronline.com`.

For information on translations, please contact Apress directly at 2855 Telegraph Avenue, Suite 600, Berkeley, CA 94705. Phone 510-549-5930, fax 510-549-5939, e-mail `info@apress.com`, or visit `http://www.apress.com`.

Apress and friends of ED books may be purchased in bulk for academic, corporate, or promotional use. eBook versions and licenses are also available for most titles. For more information, reference our Special Bulk Sales–eBook Licensing web page at `http://www.apress.com/info/bulksales`.

The source code for this book is available to readers at `http://www.apress.com`.

Contents at a Glance

PART 3 ■■■ Advanced

Contents

About the Author

GARY MAK has been a technical architect and application developer on the enterprise Java platform for six years. In his career, Gary has developed a number of Java-based software projects, most of which are core application frameworks and software tools. He enjoys designing and implementing the complex parts of software projects.

Gary is a Sun-certified Java programmer and has a master's degree in computer science. His research interests include object-oriented technology, aspect-oriented technology, design patterns, and software reuse. Gary specializes in building enterprise applications on frameworks including Spring, Hibernate, JPA, Struts, JSF, and Tapestry. He has been using the Spring framework in his projects for four years, since Spring version 1.0. Gary is also an instructor of courses on enterprise Java, Spring, Hibernate, web services, and agile development. He has written a series of Spring and Hibernate tutorials as course materials, parts of which are open to the public, and they're gaining popularity in the Java community. In his spare time, he enjoys playing tennis and watching tennis competitions.

About the Technical Reviewers

SAM BRANNEN is a senior software engineer at SpringSource, where he serves as a core developer of the Spring framework. Sam is also a member of the SpringSource team for Spring and Tomcat Integrated Products. He has been developing Java applications since 1996 and enterprise applications since 1999. During this time, Sam has enjoyed designing complex software architectures and implementing custom solutions with a focus on scalable, testable, multitiered web and client-server applications using Java (J2EE/Java EE) and the Spring framework. Sam recently designed and implemented the new annotation-driven Spring TestContext framework included in Spring 2.5.

Prior to joining SpringSource, Sam gained experience building applications for customers in various business sectors ranging from e-commerce to banking, retail, automotive, and social communities. Sam has a degree in computer science from the Georgia Institute of Technology and currently resides in the United Kingdom with his wife, Vera.

From the moment his parents gave him a Spectrum 48K for his seventh birthday, it became clear that **KRIS LANDER** was always going to be an early adopter when it came to technology. Upon leaving school, with a computer addiction and a mild vitamin A deficiency, he decided to turn his childhood passion into a serious vocation, embarking on a degree in software engineering from the University of Wales.

Kris's constant thirst for emerging Java technologies has become a trademark throughout his professional career. He has been a Java web enterprise (J2EE) specialist from day one and a developer of applications using Spring since 2003, which has led him to work on many large-scale IT projects for corporate blue chip and successful new technology companies on both sides of the Atlantic. Based and brought up in London, in his spare time he enjoys good food and music production.

Acknowledgments

I'd like to thank my family, especially my wife, Ivy. She gave me mental support in writing this book and did a great job in taking care of our family. Without her love and support, I could never have finished this book.

Additionally, I'd like to thank the Apress team who worked for this book, in particular the following individuals:

Steve Anglin, my acquisition editor, who recognized me and believed in me writing this book. He offered splendid ideas for this book's outline and organized a great team for the book.

Tom Welsh, my development editor, who provided excellent support on both the literary and technical aspects of this book. He often encouraged me when I got into writing trouble, and offered solutions to me.

Kylie Johnston, my project manager, who did a great job in managing the book schedule and responded to my requests very quickly. Her experience made the schedule very flexible so that I could do my job in a comfortable way.

Kris Lander, who reviewed this book from a technical standpoint, pointed out my faults, and gave valuable suggestions based on his rich experience in Spring.

Sam Brannen, my other technical reviewer, who gave a large number of professional comments that directly and immediately improved the book. His role as a core Spring developer made me very confident in his comments.

Damon Larson, my copy editor, who did a nice job in correcting my grammatical mistakes, improving my words, and keeping the conventions consistent throughout the book.

Laura Esterman, my production editor, who made this book look as nice as it does and handled my late modification requests.

Dina Quan, Ron Strauss, and April Eddy, who were also instrumental in making this a great book.

Introduction

Since my first time using it in 2004, I have been a big fan of Spring and have used it in almost all my projects. I'm deeply attracted to Spring's simplicity and reasonableness. Spring is the simplest and most powerful Java/Java EE application framework I have ever used, and its ability to solve difficult problems in simple ways has made a strong impression on me. The solutions offered by Spring may not be the best all over the world, but they are the most reasonable ones that I can think of.

Spring addresses most aspects of Java/Java EE application development and offers simple solutions to them. By using Spring, you will be lead to use industry best practices to design and implement your applications. The releases of Spring 2.x have added many improvements and new features to the 1.x versions. This book focuses on the latest Spring 2.5 features for building enterprise Java applications.

As a course instructor on programming technologies, I always find that the biggest challenge my students face is how to get their experimental projects running. Many programming books include code examples, but most only include code fragments, not complete projects. Most of these books provide complete projects for you to download from their web sites, but they don't provide a chance for you to build the projects step by step on your own. I believe that you'll learn a lot from the project-building process, and that you'll gain confidence once you have gotten your projects running—this was my inspiration for writing this book.

As active Java developers, we often have to master a new technology or framework. Since we are only developers who use a technology, not students who have to take an exam, we don't need to keep everything in our mind. We only need an efficient way of making references when necessary. To benefit experienced readers, and beginner readers who have read this book from cover to cover, I've organized each chapter with multiple problem-solution–based recipes. This way, you'll be able to easily look up a solution for a particular problem.

The topics in this book are introduced by complete and real-world code examples that you can follow step by step. Instead of abstract descriptions on complex concepts, you will find live examples in this book. When you start a new project, you can consider copying the code and configuration files from this book, and then modifying them for your needs. This can save you a great deal of work over creating a project from scratch.

Who This Book Is For

This book is for Java developers who would like to gain hands-on experience rapidly on Java/Java EE development using the Spring framework. If you are already a developer using Spring in your projects, you can also use this book as a reference, and you'll find the code examples very useful.

You don't need much Java EE experience to read this book. However, it assumes that you know the basics of object-oriented programming with Java (e.g., creating a class/interface, implementing an interface, extending a base class, running a main class, setting up your

classpath, and so on). It also assumes you have basic knowledge on web and database concepts and know how to create dynamic web pages and query databases with SQL statements.

How This Book Is Structured

This book covers Spring 2.5 from basic to advanced, and it introduces several common Spring projects that will bring significant value to your application development. It's divided into 19 chapters organized into 3 parts:

- *Part 1: Core*: This part focuses on the core concepts and mechanisms of the Spring framework. The chapters in this part aim to familiarize you with Spring's core so that you can learn about other topics and uses of Spring quickly.
    - *Chapter 1: Inversion of Control and Containers*: This chapter introduces the core concept of Spring—the IoC design principal—and the importance of containers. If you are already familiar with IoC, feel free to skip this chapter.
    - *Chapter 2: Introduction to Spring*: This chapter gives you an overview of Spring's architecture and related projects. It also demonstrates how to set up Spring in your development environment.
    - *Chapter 3: Bean Configuration in Spring*: This chapter introduces basic bean configuration in the Spring IoC container. Understanding the features in this chapter is required for reading the subsequent chapters.
    - *Chapter 4: Advanced Spring IoC Container*: This chapter covers the advanced features and internal mechanisms of the Spring IoC container. Although these features may not be used as frequently as those in Chapter 3, they are indispensable to a powerful container.
    - *Chapter 5: Dynamic Proxy and Classic Spring AOP*: This chapter explains why you need AOP and how you can modularize crosscutting concerns with dynamic proxies and classic Spring AOP. If you already understand AOP and want to use Spring AOP in Spring 2.x directly, feel free to skip to Chapter 6.
    - *Chapter 6: Spring 2.x AOP and AspectJ Support*: This chapter covers Spring 2.x AOP usage and some advanced AOP topics, including how to integrate the AspectJ framework into Spring applications.
- *Part 2: Fundamentals*: This part involves the fundamental topics of the Spring framework. The topics covered in this part are used frequently in developing enterprise applications.
    - *Chapter 7: Spring JDBC Support*: This chapter shows how Spring can simplify JDBC's uses through its JDBC accessing framework. It also serves as an introduction to Spring's data access module.
    - *Chapter 8: Transaction Management in Spring*: This chapter discusses Spring's different transaction management approaches and explains transaction attributes in detail.

- *Chapter 9: Spring ORM Support*: This chapter focuses on how to integrate popular ORM frameworks, including Hibernate and JPA, into Spring applications.
- *Chapter 10: Spring MVC Framework*: This chapter covers web-based application development using the Spring Web MVC framework, with both the traditional approach and the new annotation-based approach.
- *Chapter 11: Integrating Spring with Other Web Frameworks*: This chapter introduces how to integrate the Spring framework with several popular web application frameworks, including Struts, JSF, and DWR.
- *Chapter 12: Spring Testing Support*: This chapter covers basic testing techniques in Java applications and the testing support features offered by the Spring framework.

- *Part 3: Advanced*: This part covers advanced topics of the Spring framework and related projects. However, thoroughly covering each of these topics would require an entire book. The aim of these chapters is to provide you with the useful basics and usages specific to Spring.
  - *Chapter 13: Spring Security*: This chapter introduces how to secure applications using the Spring Security framework, formerly known as Acegi Security. This chapter focuses on securing web applications using Spring Security 2.0.
  - *Chapter 14: Spring Portlet MVC Framework*: This chapter covers portlet application development using the Spring Portlet MVC framework, and focuses on the portlet-specific features that are different from Web MVC.
  - *Chapter 15: Spring Web Flow*: This chapter introduces how to use Spring Web Flow to model and manage your web application's UI flows. This chapter focuses on using Spring Web Flow 2.0 in Spring MVC and JSF.
  - *Chapter 16: Spring Remoting and Web Services*: This chapter covers Spring's support for various remoting technologies, including RMI, Hessian, Burlap, HTTP Invoker, and Web Services. It also introduces developing contract-first web services using Spring Web Services.
  - *Chapter 17: Spring Support for EJB and JMS*: This chapter discusses how to develop EJB 2.x and 3.0 components with Spring's EJB support, and how to use Spring's JMS support to simplify sending, receiving, and listening for JMS messages.
  - *Chapter 18: Spring Support for JMX, E-mail, and Scheduling*: This chapter discusses how to export Spring beans as JMX MBeans and access remote MBeans. This chapter also introduces how to send e-mail and schedule tasks with Spring's e-mail and scheduling support.
  - *Chapter 19: Scripting in Spring*: This chapter discusses how to use popular scripting languages, including JRuby, Groovy, and BeanShell, in Spring applications.

Each chapter of this book discusses a Spring topic with multiple problem-solution recipes. You can look up a solution for a particular problem and see how the solution works in the "How It Works" section. Each chapter demonstrates a topic with a complete real-world example. The example within a chapter is coherent, but examples are independent between chapters.

Conventions

Sometimes when I want you to pay particular attention to a part within a code example, I will make this part's font bold. Please note that a bold part doesn't reflect a code change from the last version. In cases when a code line is too long to fit the page width, I will break it with a code continuation character (➥). Please note that when you try out the code, you have to concatenate the line by yourself without any space.

Prerequisites

Because the Java programming language is platform independent, you are free to choose any supported operating system. However, I should let you know that I am using Microsoft Windows because the file system paths I present in this book are Windows-based. You can simply convert these paths into your operating system's format before trying out the code.

To make the most of the book, you should install JDK version 1.5 or higher. You should also have a Java IDE installed to make development easier. For this book, I have been using Eclipse Web Tools Platform (WTP) to develop my projects, and I recommend you install it also.

Downloading the Code

The source code for this book is available from the Apress web site (`http://www.apress.com`), in the Source Code/Download section. The source code is organized by chapters, each of which includes one or more independent Eclipse projects. Please refer to `readme.txt`, located in the root, for setting up and running the source code.

Contacting the Author

I always welcome your questions and feedback regarding to the contents of this book. You can send your comments to `springrecipes@metaarchit.com` and access the book discussion and updates on `http://www.metaarchit.com`.