

Join the discussion @ p2p.wrox.com



Wrox **Programmer to Programmer™**



Beginning

Spring

Forewords by Rod Johnson and Jürgen Höller

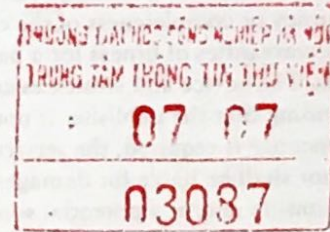
Mert Çalışkan and Kenan Sevindik

BEGINNING SPRING

| | |
|---|-------|
| FOREWORDS | xxvii |
| INTRODUCTION | xxxi |
| CHAPTER 1 POJO Programming Model, Lightweight Containers, and Inversion of Control | 1 |
| CHAPTER 2 Dependency Injection with Spring | 17 |
| CHAPTER 3 Building Web Applications Using Spring MVC | 63 |
| CHAPTER 4 JDBC Data Access with Spring | 103 |
| CHAPTER 5 Data Access with JPA Using Spring | 137 |
| CHAPTER 6 Managing Transactions with Spring | 175 |
| CHAPTER 7 Test-Driven Development with Spring | 209 |
| CHAPTER 8 Aspect-Oriented Programming with Spring | 237 |
| CHAPTER 9 Spring Expression Language | 263 |
| CHAPTER 10 Caching | 285 |
| CHAPTER 11 RESTful Web Services with Spring | 305 |
| CHAPTER 12 Securing Web Applications with Spring Security | 331 |
| CHAPTER 13 Next Stop: Spring 4.0 | 369 |
| APPENDIX Solutions to Exercises | 385 |
| INDEX | 425 |

BEGINNING Spring

Mert Çalışkan
Kenan Sevindik



Beginning Spring

Published by
John Wiley & Sons, Inc.
10475 Crosspoint Boulevard
Indianapolis, IN 46256
www.wiley.com

Copyright © 2015 by John Wiley & Sons, Inc., Indianapolis, Indiana

Published simultaneously in Canada

ISBN: 978-1-118-89292-3
ISBN: 978-1-118-89303-6 (ebk)
ISBN: 978-1-118-89311-1 (ebk)

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 646-8600. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at <http://www.wiley.com/go/permissions>.

Limit of Liability/Disclaimer of Warranty: The publisher and the author make no representations or warranties with respect to the accuracy or completeness of the contents of this work and specifically disclaim all warranties, including without limitation warranties of fitness for a particular purpose. No warranty may be created or extended by sales or promotional materials. The advice and strategies contained herein may not be suitable for every situation. This work is sold with the understanding that the publisher is not engaged in rendering legal, accounting, or other professional services. If professional assistance is required, the services of a competent professional person should be sought. Neither the publisher nor the author shall be liable for damages arising herefrom. The fact that an organization or Web site is referred to in this work as a citation and/or a potential source of further information does not mean that the author or the publisher endorses the information the organization or Web site may provide or recommendations it may make. Further, readers should be aware that Internet Web sites listed in this work may have changed or disappeared between when this work was written and when it is read.

For general information on our other products and services please contact our Customer Care Department within the United States at (877) 762-2974, outside the United States at (317) 572-3993 or fax (317) 572-4002.

Wiley publishes in a variety of print and electronic formats and by print-on-demand. Some material included with standard print versions of this book may not be included in e-books or in print-on-demand. If this book refers to media such as a CD or DVD that is not included in the version you purchased, you may download this material at <http://booksupport.wiley.com>. For more information about Wiley products, visit www.wiley.com.

Library of Congress Control Number: 2014954686

Trademarks: Wiley, the Wiley logo, Wrox, the Wrox logo, Programmer to Programmer, and related trade dress are trademarks or registered trademarks of John Wiley & Sons, Inc. and/or its affiliates, in the United States and other countries, and may not be used without written permission. All other trademarks are the property of their respective owners. John Wiley & Sons, Inc., is not associated with any product or vendor mentioned in this book.

ABOUT THE AUTHORS

This is for you, Love.

—MERT ÇALIŞKAN

To my Mom, and to the memory of my Dad...

—KENAN SEVINDİK

ABOUT THE AUTHORS

MERT ÇALIŞKAN is a Principle Software Architect living in Ankara, Turkey. He has more than 10 years of expertise in software development with the architectural design of Enterprise Java web applications. Çalışkan is an open source advocate for software projects such as PrimeFaces, and he is the co-author of *PrimeFaces Cookbook*, first and second editions (Packt Publishing, 2013). He is the founder of AnkaraJUG, which is the most active JUG in Turkey. Çalışkan is part-time lecturer at Hacettepe University about Enterprise Web Applications' Architecture and Web Services. In 2014, he achieved the title of Java Champion. He shares his knowledge at national and international conferences such as JDays 2015, JavaOne 2013, JDC2010, and JSFDays'08. You can follow him on Twitter @mertcal.

KENAN SEVINDIK specializes in architecting and developing enterprise applications using various Java technologies. His experience with Java dates back to 1998 when he started developing Java applets for online education programs at his university. He has been working with Spring Application Framework and Spring Security Framework since their initial phases. Sevindik has a bachelor's degree in computer engineering. Currently he works with Harezmi IT Solutions, where he develops enterprise software and gives training, mentoring, and consulting services about Java, OOP, AOP, Spring, Spring Security, and Hibernate all over the world. You can read his technical writings at <http://blog.harezmi.com.tr> and reach him at ksevindik@harezmi.com.tr.

ABOUT THE TECHNICAL EDITOR

CHÁD (SHOD) DARBY is an author, instructor, and speaker in the Java development world. As a recognized authority on Java applications and architectures, he has presented technical sessions at software development conferences worldwide. In his fifteen years as a professional software architect, he's had the opportunity to work for Blue Cross/Blue Shield, Merck, Boeing, Red Hat and a handful of startup companies. Chád is a contributing author to several Java books, including *Professional Java E-Commerce* (Wiley, 2001) and *Beginning Java Networking* (Wiley, 2001). Chád has Java certifications from Sun Microsystems and IBM. He holds a B.S. in Computer Science from Carnegie Mellon University. Visit Chád's blog at www.1uv2code.com to view his free video tutorials on Java. You can also follow him on Twitter @darby1uvs2code.

CREDITS

Project Editor

Charlotte Kughen

Technical Editors

Chád Darby

Krishna Srinivasan

Production Editor

Rebecca Anderson

Copy Editor

Kim Cofer

Manager of Content Development and Assembly

Mary Beth Wakefield

Marketing Director

David Mayhew

Marketing Manager

Carrie Sherrill

Professional Technology and Strategy Director

Barry Pruett

Business Manager

Amy Knies

Associate Publisher

Jim Minatel

Project Coordinator, Cover

Patrick Redmond

Proofreader

Nancy Carrasco

Indexer

Johnna VanHoose Dinse

Cover Designer

Wiley

Cover Image

©iStock.com/lldrea

ACKNOWLEDGMENTS

FIRST I WOULD LIKE to thank my friend, Kenan Sevindik, for joining me on this journey. Special thanks go to the creators of the Spring Framework, Rod Johnson and Jürgen Höller, for crowning our book with their Forewords. Without their ideas and inspirations that ignited all of us, this book wouldn't even exist.

I also would like to thank our associate publisher, Jim Minatel; project editor, Charlotte Kughen; technical editors, Chád Darby and Krishna Srinivasan; copy editor, Kim Cofer; and production editor, Rebecca Anderson. These people accompanied us during the entire writing process and made the book publication possible with their support, suggestions, and reviews.

Last but not the least, I would like to thank my mom, my dad, my Tuğçe, and especially my beloved Funda, who gives me her never-ending support and enthusiasm.

—MERT ÇALIŞKAN

FIRST OF ALL, I would like to thank my wife, Betül, for her endless support while I was writing this book. I also would like to thank my colleague, Muammer Yücel, for his encouragement and motivation. Although this book is a direct result of our extensive experience with the Spring Application Framework, it wouldn't be what it is without the help and valuable comments of our project editor, Charlotte Kughen; technical editors, Chád Darby and Krishna Srinivasan; copy editor, Kim Cofer; and production editor, Rebecca Anderson.

—KENAN SEVINDIK

CONTENTS

| | |
|--|--------------|
| FOREWORDS | xxvii |
| INTRODUCTION | xxxii |
| CHAPTER 1: POJO PROGRAMMING MODEL, LIGHTWEIGHT CONTAINERS, AND INVERSION OF CONTROL | 1 |
| POJO Programming Model | 2 |
| Problems of the Old EJB Programming Model | 2 |
| Benefits of the POJO Programming Model | 7 |
| Lightweight Containers and Inversion of Control (IoC) | 8 |
| Lightweight Containers | 8 |
| Inversion of Control (IoC) | 9 |
| Dependency Injection | 10 |
| Setter Injection | 11 |
| Constructor Injection | 11 |
| Setter or Constructor Injection | 12 |
| Summary | 12 |
| CHAPTER 2: DEPENDENCY INJECTION WITH SPRING | 17 |
| Spring IoC Container | 18 |
| Configuration Metadata | 18 |
| Configuring and Using the Container | 21 |
| Dependency Injection | 29 |
| Setter Injection | 30 |
| Constructor Injection | 31 |
| Circular Dependencies | 34 |
| Dependency Resolution Process | 35 |
| Overriding Bean Definitions | 36 |
| Using the depends-on Attribute | 38 |
| Autowiring | 39 |
| Bean Lookups | 43 |
| Spring-Managed Beans | 44 |
| Naming Beans | 44 |
| Bean Instantiation Methods | 45 |
| Bean Scopes | 48 |
| Lazy Initialization | 51 |

| | |
|--|-----------|
| | 52 |
| | 54 |
| Life-Cycle Callbacks | 56 |
| Bean Definition Profiles | 59 |
| Environment | |
| Summary | 63 |
| CHAPTER 3: BUILDING WEB APPLICATIONS USING SPRING MVC | 63 |
| Learning the Features and Benefits of Spring MVC | 64 |
| Using the Dispatcher Servlet Mechanism | 65 |
| Defining the Servlet | 66 |
| Accessing Servlet Context | 67 |
| Creating Your First Spring MVC Application | 68 |
| Configuring Spring MVC with Annotations | 71 |
| Handling Forms with JSP | 73 |
| Configuring the Form Tag Library | 73 |
| Understanding the Power of Binding | 74 |
| Working with Forms | 74 |
| Using Input Elements | 75 |
| Entering Dates | 76 |
| Selecting from a Drop-Down | 77 |
| Selecting with Radio Buttons | 78 |
| Selecting with Checkboxes | 78 |
| Adding Labels | 78 |
| Placing Buttons | 79 |
| Styling | 79 |
| Exploiting the Power of Annotations | 84 |
| @Controller | 84 |
| @RequestMapping | 84 |
| @ModelAttribute | 84 |
| @PathVariable | 85 |
| @ControllerAdvice | 85 |
| @InitBinder | 85 |
| @ExceptionHandler | 85 |
| Validating User Input | 86 |
| Uploading Files | 90 |
| Handling Exceptions | 93 |
| Implementing Internationalization (i18n) | 95 |
| Using Themes | 97 |
| Summary | 100 |

| | |
|---|------------|
| CHAPTER 4: JDBC DATA ACCESS WITH SPRING | 103 |
| Problems with Using Vanilla JDBC | 104 |
| Introducing Spring's JDBC Support | 105 |
| Managing JDBC Connections | 105 |
| Embedded DB Support | 108 |
| Using a Connection-Pooled DataSource | 110 |
| Initializing DB | 111 |
| Configuring and Using Spring's JDBC Support | 112 |
| Performing Data Access Operations with Spring | 114 |
| Running Queries | 114 |
| Queries with Named Parameters | 117 |
| Writing Queries Using the IN Clause | 118 |
| Using PreparedStatement within JdbcTemplate | 119 |
| Inserting, Updating, and Deleting Records | 121 |
| Calling Stored Procedures and Stored Functions | 124 |
| Performing Batch Operations | 126 |
| Handling BLOB and CLOB Objects | 126 |
| Accessing Vendor-Specific JDBC Methods | 127 |
| Executing DDL Operations | 127 |
| Modeling JDBC Operations as Java Objects | 128 |
| Encapsulating SQL Query Executions | 128 |
| Encapsulating SQL DML Operations | 130 |
| Encapsulating Stored Procedure Executions | 131 |
| Exception Handling and Error Code Translation | 132 |
| Common Data Access Exception Hierarchy | 132 |
| Automatic Handling and Translation of SQLException | 132 |
| Summary | 133 |
| CHAPTER 5: DATA ACCESS WITH JPA USING SPRING | 137 |
| Brief Introduction to ORM and JPA | 138 |
| Paradigm Mismatch | 138 |
| Building Blocks of an ORM Framework | 139 |
| What JPA Offers | 139 |
| Mapping the Object Model to the Relational Model | 140 |
| Defining Entities | 140 |
| Mapping Attributes to Columns | 141 |
| Creating Associations between Objects | 142 |
| Mapping Java Types to SQL Types | 145 |