Edward Lavieri, Peter Verhas 著

精通Java 9

(影印版)

Mastering Java 9



Packt>

精通 Java 9(影印版) Mastering Java 9

Edward Lavieri, Peter Verhas 著



南京 东南大学出版社

图书在版编目(CIP)数据

精通 Java 9:英文/(美)爱德华·拉维耶里(Edward Lavieri),(美)皮特·维哈斯(Peter Verhas)著. 一影印本,一南京:东南大学出版社,2018.8

书名原文: Mastering Java 9 ISBN 978-7-5641-7735-5

I. ①精··· Ⅱ. ①爱··· ②皮··· Ⅲ. ①JAVA 语言—程序设计—英文 Ⅳ. ①TP312.8

中国版本图书馆 CIP 数据核字(2018)第 100079 号图字:10-2018-099 号

© 2017 by PACKT Publishing Ltd.

Reprint of the English Edition, jointly published by PACKT Publishing Ltd and Southeast University Press, 2018. Authorized reprint of the original English edition, 2018 PACKT Publishing Ltd, the owner of all rights to publish and sell the same.

All rights reserved including the rights of reproduction in whole or in part in any form.

英文原版由 PACKT Publishing Ltd 出版 2017。

英文影印版由东南大学出版社出版 2018。此影印版的出版和销售得到出版权和销售权的所有者—— PACKT Publishing Ltd 的许可。

版权所有,未得书面许可,本书的任何部分和全部不得以任何形式重制。

精通 Java 9(影印版)

出版发行:东南大学出版社

地 址:南京四牌楼 2号 邮编:210096

出版人: 江建中

网 址: http://www.seupress.com

电子邮件: press@seupress.com

印 刷:常州市武进第三印刷有限公司

开 本: 787毫米×980毫米 16开本

印 张: 28.5

字 数:558千字

版 次: 2018年8月第1版

印 次: 2018年8月第1次印刷

书 号: ISBN 978-7-5641-7735-5

定 价:99.00元

Credits

Authors

Dr. Edward Lavieri

Peter Verhas

Reviewer

Mandar Jog

Commissioning Editor

Kunal Parikh

Acquisition Editor

Denim Pinto

Content Development Editor

Lawrence Veigas

Technical Editor

Abhishek Sharma

Copy Editor

Safis Editing

Project Coordinator

Prajakta Naik

Proofreader

Safis Editing

Indexer

Francy Puthiry

Graphics

Jason Monteiro

Production Coordinator

Arvindkumar Gupta

About the Authors

Dr. Edward Lavieri is a veteran developer with a strong academic background. He earned a doctorate in computer science from Colorado Technical University, an MS in management information systems (Bowie State University), an MS in education (Capella University), and an MS in operations management (University of Arkansas).

He has been creating and teaching computer science courses since 2002. Edward retired from the U.S. Navy as a Command Master Chief after 25 years of service. As the founder and creative director of three19, a software design and development studio, Edward is constantly designing and developing software. He uses a variety of game engines and development tools. His passions include developing adaptive learning systems, educational games, and mobile apps.

Edward has authored Adaptive Learning for Educational Game Design (CreateSpace), Getting Started with Unity 5 (Packt), Learning AWS Lumberyard Game Development (Packt), LiveCode Mobile Development HOTSHOT (Packt), LiveCode Mobile Development Cookbook (Packt), and Software Consulting: A Revolutionary Approach (CreateSpace). He was the technical editor for Excel Formulas and Functions for Dummies (Wiley Publishing). He has also developed numerous college courses involving computer science, information systems, and game development.

Peter Verhas is a senior developer and software system architect with more than 30 years of software development experience. He currently works for EPAM as a senior developer, where he is involved in many customer projects and actively participates in the education activities of the company. Peter writes a technical blog and is committed to open source software development. He has been using Java since 2005 and is also an author at Java Code Geeks.

About the Reviewer

Mandar Jog is an expert IT trainer with over 15 years of training experience. He is an expert in technologies such as Java, J2EE, and Android. He also holds SCJP and SCWCD certifications. He is an occasional blogger where he makes the readers feel "I can" for the complex concepts in Java and J2EE. He is a regular speaker at many engineering colleges for technical seminars and workshops.

He was also the technical reviewer of the book, Modular Programming in Java 9 by Packt.

Thanks a lot Tejaswini, you have been my inspiration throughout this journey. I am equally grateful to my son, Ojas; his lovely smiles have always made me push myself further.

www.PacktPub.com

For support files and downloads related to your book, please visit www.PacktPub.com.

Did you know that Packt offers eBook versions of every book published, with PDF and ePub files available? You can upgrade to the eBook version at www.PacktPub.com and as a print book customer, you are entitled to a discount on the eBook copy. Get in touch with us at service@packtpub.com for more details.

At www.PacktPub.com, you can also read a collection of free technical articles, sign up for a range of free newsletters and receive exclusive discounts and offers on Packt books and eBooks.



www.packtpub.com/mapt

Get the most in-demand software skills with Mapt. Mapt gives you full access to all Packt books and video courses, as well as industry-leading tools to help you plan your personal development and advance your career.

Why subscribe?

- Fully searchable across every book published by Packt
- · Copy and paste, print, and bookmark content
- · On demand and accessible via a web browser

Customer Feedback

Thanks for purchasing this Packt book. At Packt, quality is at the heart of our editorial process. To help us improve, please leave us an honest review on this book's Amazon page at https://www.amazon.com/dp/1786468735.

If you'd like to join our team of regular reviewers, you can e-mail us at <code>customerreviews@packtpub.com</code>. We award our regular reviewers with free eBooks and videos in exchange for their valuable feedback. Help us be relentless in improving our products!

Table of Contents

Pretace	1
Chapter 1: The Java 9 Landscape	7
Java 9 at 20,000 feet	7
Breaking the monolith	9
Playing around with the Java Shell	10
Taking control of external processes	11
Boosting performance with G1	11
Measuring performance with JMH	11
Getting started with HTTP 2.0	12
Encompassing reactive programming	12
Expanding the wish list	12
Summary	13
Chapter 2: Discovering Java 9	15
Improved Contended Locking [JEP 143]	16
Improvement goals	17
Segmented code cache [JEP 197]	17
Memory allocation	18
Smart Java compilation, phase two [JEP 199]	19
Resolving Lint and Doclint warnings [JEP 212]	19
Tiered attribution for javac [JEP 215]	20
Annotations pipeline 2.0 [JEP 217]	21
New version-string scheme [JEP 223]	23
Generating run-time compiler tests automatically [JEP 233]	23
Testing class-file attributes generated by Javac [JEP 235]	24
Storing interned strings in CDS archives [JEP 250]	26
The problem	26
The solution	27
Preparing JavaFX UI controls and CSS APIs for modularization [JEP	
253]	27
JavaFX overview	27
Implications for Java 9	29
Compact strings [JEP 254]	30
Pre-Java 9 status	31
New with Java 9	31

	Merging selected Xerces 2.11.0 updates into JAXP [JEP 255]	31
	Updating JavaFX/Media to newer version of GStreamer [JEP 257]	32
	HarfBuzz Font-Layout Engine [JEP 258]	33
	HiDPI graphics on Windows and Linux [JEP 263]	34
	Marlin graphics renderer [JEP 265]	35
	Unicode 8.0.0 [JEP 267]	35
	New in Unicode 8.0.0	35
	Updated Classes in Java 9	36
	Reserved stack areas for critical sections [JEP 270]	36
	The pre-Java 9 situation	36
	New in Java 9	37
	Dynamic linking of language-defined object models [JEP 276]	38
	Proof of concept	39
	Additional tests for humongous objects in G1 [JEP 278]	39
	Improving test-failure troubleshooting [JEP 279]	41
	Environmental information	41
	Java process information	42
	Optimizing string concatenation [JEP 280]	42
	HotSpot C++ unit-test framework [JEP 281]	43
	Enabling GTK 3 on Linux [JEP 283]	43
	New HotSpot build system [JEP 284]	45
	Summary	45
Cha	pter 3: Java 9 Language Enhancements	47
	Working with variable handlers [JEP 193]	48
	Working with the AtoMiC Toolkit	49
	Using the sun.misc.Unsafe class	51
	Eliding depreciation warnings on import statements [JEP 211]	52
	Milling Project Coin [JEP 213]	53
	Using the @SafeVarargs annotation	53
	The try-with-resource statement	54
	Using the diamond operator	56
	Discontinuing use of the underscore	57
	Making use of private interface methods	58
	Processing import statements correctly [JEP 216]	60
	Summary	62
Cha	pter 4: Building Modular Applications with Java 9	63
	A modular primer	64
	Reviewing Java's platform module system [JEP-200]	66

	Modularizing JDK source code [JEP-201]	70
	Pre-Java 9 JDK source code organization	71
	Development tools	72
	Deployment	72
	Internationalization	72
	Monitoring	73
	RMI	73
	Security	73
	Troubleshooting Web services	73
	JavaFX tools	74 74
	Java runtime environment	74
	Source code	74
	Libraries	75
	C header files	76
	Database	77
	JDK source code reorganized	77
	Understanding modular run-time images [JEP-220]	77
	Runtime format adoption	78
	Runtime image restructure	78
	Supporting common operations	80
	De-privileging JDK classes	80
	Preserving existing behaviors	80
	Getting to know the module system [JEP-261]	80
	Module paths	81
	Access-control boundary violations	82
	Runtime	82
	Modular Java application packaging [JEP-275]	84
	Advanced look at the Java Linker	85
~	Java Packager options	85
	JLink - The Java Linker [JEP-282]	89
	Encapsulating most internal APIs [JEP-260]	91
	Summary	92
Chap	ter 5: Migrating Applications to Java 9	93
	Quick review of Project Jigsaw	94
	Classpath	
	AND THE RESERVE OF THE PROPERTY OF THE PROPERT	94
	The monolithic nature of the JDK	95
	How modules fit into the Java landscape	96
	Base module	97
	Reliable configuration	98
	Strong encapsulation	99

Migration planning	100
Testing a simple Java application	100
Potential migration issues	103
The JRE	104
Access to internal APIs	104
Accessing internal JARs	105
JAR URL depreciation	105
Extension mechanism	107
The JDK's modularization	108
Advice from Oracle	109
Preparatory steps	110
Getting the JDK 9 early access build	110
Running your program before recompiling	110
Updating third-party libraries and tools	110
Compiling your application	111
Pre-Java 9 -source and -target options	113
Java 9 -source and -target options	114
Running jdeps on your code	114
Breaking encapsulation	117
Theadd-opens option	118
Theadd-exports option	118
Thepermit-illegal-access option	119
Runtime image changes	119
Java version schema	119
JDK and JRE layout	120
What has been removed	122
Updated garbage collection	123
Deployment	124
JRE version selection	124
Serialized applets	124
JNLP update	125
Nested resources	125
FX XML extension	125
JNLP file syntax	127
Numeric version comparison	127
Useful tools	128
Java environment - jEnv	129
Maven	130
Obtaining the M2Eclipse IDE	131
Summary	134
Chapter 6: Experimenting with the Java Shell	135
What is JShell?	136
Getting Started with JShell	136
	100

Practical uses of JShell	142
Feedback modes	143
Creating a custom feedback mode	148
Listing your assets	150
Editing in the JShell	151
Modifying text	151
Basic navigation	152
Historical navigation	152 153
Advanced editing commands Working with scripts	153
•	153
Start up scripts	
Loading scripts	154
Saving scripts	154
Advanced scripting with JShell	155
Summary	156
Chapter 7: Leveraging the New Default G1 Garbage Collector	157
Overview of garbage collection	158
Object life cycle	158
Object creation	158
Object mid-life	159
Object destruction	159
Garbage collection algorithms Mark and sweep	160 160
Concurrent mark sweep (CMS) garbage collection	160
Serial garbage collection	161
Parallel garbage collection	161
G1 garbage collection	161
Garbage collection options	162
Java methods relevant to garbage collection	167
The System.gc() method	168
The finalize() method	170
Pre-Java 9 garbage collection	171
Visualizing garbage collection	172
Garbage collection upgrades in Java 8	173
Case study - Games written with Java	174
Collecting garbage with the new Java platform	175
Default garbage collection	175
Depreciated garbage collection combinations	177
Unified garbage collection logging	178
Unified JVM logging (JEP-158)	179
Tags	179
Levels	180

	Decorations	180
	Output	181
	Command-line options	181
	Unified GC logging (JEP-271)	181
	Garbage collection logging options	182
	The gc tag Macros	184
	Additional considerations	184
	Persistent issues	185
	Making objects eligible for garbage collection	186 186
	Summary	189
Chap	ter 8: Microbenchmarking Applications with JMH	191
	Microbenchmarking overview	
	Approach to using JMH	192
	Installing Java 9 and Eclipse with Java 9 support	193
	Hands-on experiment	193 196
	Microbenchmarking with Maven	198
	Benchmarking options	205
	Modes	206
	Time units	206
	Techniques for avoiding microbenchmarking pitfalls	207
	Power management	207
	OS schedulers	207
	Time sharing	208
	Eliminating dead-code and constant folding	208
	Run-to-run variance	209
	Cache capacity	210
	Summary	210
Chan	ter 9: Making Use of the ProcessHandle API	
Onap		211
	What are processes?	212
	The new ProcessHandle interface	213
	Getting the PID of the current process	213
	Getting information about a process	214
	Listing processes	216
	Listing children	216
	Listing descendants	217
	Listing all processes	218
	Waiting for processes	219
	Terminating processes	220
	A small process controller application	222
	· · · · · · · · · · · · · · · · · · ·	222

[vi]

	Main class		223
	Parameters class		224
	The ParamsAndHandle class		225
	The ControlDaemon class		226
	Summary		229
Chap	ter 10: Fine-Grained Stack Tracing		231
	Overview of the Java Stack		231
	The importance of stack information		232
	Example - Restricting callers		234
	Example - Getting logger for caller		237
	Working with StackWalker		238
	Getting an instance of StackWalker		238
	RETAIN_CLASS_REFERENCE		238
	SHOW_REFLECT_FRAMES		239
	SHOW_HIDDEN_FRAMES		239
	Final thoughts on enum constants		242
	Accessing classes		242
	Walking methods		243
	StackFrame		245
	Performance		246
	Summary		246
Chap	oter 11: New Tools and Tool Enhancemen	nts	247
	The new HTTP client [JEP-110]		248
	The HTTP client before Java 9		248
	Java 9's new HTTP client		251
	New API limitations		252
	Simplified Doclet API [JEP-221]		254
	The pre-Java 9 Doclet API		254
	API enums		256
	API classes		256
	API interfaces		257
	Problems with the pre-existing Doclet API		258
	Java 9's Doclet API		258
	Compiler tree API		258
	Language model API The AnnotatedConstruct interface		262 263
	The SourceVersion enum		263
	The UnknownEntityException exception		265
	HTML5 Javadoc [JEP-224]		266
	Javadoc search [JEP-225]		271
	Introducing camel case search		272

	Remove launch-time JRE version selection [JEP-231]		272
	Parser API for Nashorn [JEP-236]		273
	Nashorn		273
	Using Nashorn as a command-line tool		274
	Using Nashorn as an embedded interpreter		277
	EMCAScript		278
	Parser API		279
	Multi-release JAR files [JEP-238]		281
	Identifying multi-release JAR files		281
	Related JDK changes		283
	Java-level JVM compiler interface [JEP-243]		284
	BeanInfo annotations [JEP-256]		285
	JavaBean		285
	BeanProperty		286
	SwingContainer		287
	BeanInfo classes		287
	TIFF image input/output [JEP-262]		288
	Platform logging API and service [JEP-264]		290
	The java.util.logging package		291
	Logging in Java 9		293
	XML Catalogs [JEP-268]		294
	The OASIS XML Catalog standard		294
	JAXP processors		295
	XML Catalogs prior to Java 9		295
	Java 9 platform changes		295
	Convenience factory methods for collections [JEP-269]		295
	Using collections before Java 9		296
	Using new collection literals		299
	Platform-specific desktop features [JEP-272]		299
	Enhanced method handles [JEP-274]		300
	Reason for the enhancement	7	301
	Lookup functions		301
	Argument handling		302
	Additional combinations		302
	Enhanced deprecation [JEP-277]		303
	What the @Deprecated annotation really means		304
	Summary		304
Chap	ter 12: Concurrency and Reactive Programming		305
	Reactive Programming		306

	Reactive programming standardization		307
	The New Flow API		309
	The Flow.Publisher interface		310
	The Flow.Subscriber interface		310
	The Flow.Subscription interface		310
4	The Flow.Processor interface		311
	Sample implementation		311
	Additional Concurrency Updates		313
	Java concurrency		313
	Concurrency explained		313
	System configurations		314
	Java threads Concurrency improvements		315 318
	CompletableFuture API enhancements		319
	Class details		320
	Enhancements		324
	Spin-Wait Hints		325
	Summary		326
Chap	ter 13: Security Enhancements		327
	Datagram Transport Layer Security		328
	DTLS protocol version 1.0		328
	DTLS protocol version 1.2		330
	DTLS support in Java 9		333
	Creating PKCS12 keystores		334
	Keystore primer		334
	Java Keystore (JKS)		334
	Builder		335
	The CallbackHandlerProtection class		336
	The PasswordProtection class		336
	The PrivateKeyEntry class		337
	The SecretKeyEntry class The TrustedCertificateEntry class		337 338
	PKCS12 default in Java 9		339
	Improving security application performance		339
	Security policy enforcement		340
	Permission evaluation		341
	The java.Security.CodeSource package		341
	Package checking algorithm		342
	TLS application-layer protocol negotiation extensi	on	343
	TLS ALPN extension	IDACID.	344
	The javax.net.ssl package		344