OCP

Oracle Certified Professional Java® SE 11 Programmer I

STUDY GUIDE

EXAM 1Z0-815

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JEANNE BOYARSKY
SCOTT SELIKOFF

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In memory of nine amazing years at World Maker Faire and in honor of the new FIRST robotics lab at Stuyvesant. May we have many human and robotic guests.
—Jeanne

For my youngest daughter, Elysia, you make me smile and laugh every day.
—Scott

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Scott could not have reached this point without his wife Patti and family, whose love and support makes this book possible. He would like to thank his twin daughters, Olivia and Sophia, and youngest daughter, Elysia, for their patience and understanding especially when it was "time for Daddy to work in his office!" Scott would like to extend his gratitude to his wonderfully patient co-author, Jeanne, on this, their fourth book. He doesn't know how she puts up with him, but he's glad she does and thrilled at the quality of books we produce. A big thanks to Matt Dalen, who has been a great friend, sounding board, and caring father to Olivia and Adeline. Joel McNary introduced Scott to `CodeRanch.com` and encouraged him to post regularly, a step that changed his life. Finally, Scott would like to thank his mother and retired teacher, Barbara Selikoff, for teaching him the value of education, and his father, Mark Selikoff, for instilling in him the benefits of working hard.

Last but not least, both Scott and Jeanne would like to give a big thank-you to the readers of our Java 8 certification books. Hearing from all of you who enjoyed the book and passed the exam is a great feeling. A special thank-you to Campbell Ritchie, who fielded an almost uncountable number of the questions on `CodeRanch.com`, helping readers understand the material better. We'd also like to thank those who pointed out errors and made suggestions for improvements in our practice exams book. As of August 2019, the top two were Juerg Bauman and Tamas Szekeres. We would also like to thank Noorul Hameed and Nurettin Armucutu for running a tight race for third-place errata reporter.

About the Authors

Jeanne Boyarsky was selected as a Java Champion in 2019. She has worked as a Java developer for more than 17 years at a bank in New York City where she develops, mentors, and conducts training. Besides being a senior moderator at `CodeRanch.com` in her free time, she works on the forum code base. Jeanne also mentors the programming division of a FIRST robotics team where she works with students just getting started with Java. She also speaks at several conferences each year.

Jeanne got her Bachelor of Arts degree in 2002 and her Master in Computer Information Technology degree in 2005. She enjoyed getting her Master's degree in an online program while working full-time. This was before online education was cool! Jeanne is also a Distinguished Toastmasters and a Scrum Master. You can find out more about Jeanne at `www.jeanneboyarsky.com`.

Scott Selikoff is a professional software consultant, author, and owner of Selikoff Solutions, LLC, which provides software development solutions to businesses in the tri-state New York City area. Skilled in a plethora of software languages and platforms, Scott specializes in full-stack database-driven systems, cloud-based applications, microservice architectures, and service-oriented architectures.

A native of Toms River, New Jersey, Scott achieved his Bachelor of Arts degree from Cornell University in Mathematics and Computer Science in 2002, after three years of study. In 2003, he received his Master of Engineering degree in Computer Science, also from Cornell University.

As someone with a deep love of education, Scott has always enjoyed teaching others new concepts. He's given lectures at Cornell University and Rutgers University, as well as conferences including Oracle Code One and The Server Side Java Symposium. Scott lives in New Jersey with his loving wife, Patti, three amazing daughters, twins Olivia and Sophia and little Elysia, along with two very playful dogs, Webby and Georgette. You can find out more about Scott at `www.linkedin.com/in/selikoff`.

Jeanne and Scott are both moderators on the `CodeRanch.com` forums and can be reached there for question and comments. They also co-author a technical blog called Down Home Country Coding at `www.selikoff.net`.

In addition to this book, Scott and Jeanne are also authors of the following best-selling Java 8 certification books: *OCA Oracle Certified Associate Java SE 8 Programmer I Study Guide* (Sybex, 2015) and *OCP Oracle Certified Professional Java SE 8 Programmer II Study Guide* (Sybex, 2016). These two books have been combined into the single release: *OCA/OCP Java SE 8 Programmer Certification Kit: Exam 1Z0-808 and Exam 1Z0-809* (Sybex 2016). They have also written a book of practice test questions for the Java 8 certification exams: *OCA/OCP Java SE 8 Programmer Practice Tests* (Sybex, 2017).

Contents at a Glance

Contents

Introduction

This book is for those studying for the IZ0-815 (Java SE Programmer I) or IZ0-811 (Java Foundations) exam along with those looking to learn Java more deeply.

If you've taken the OCA 7 or OCA 8 exam, note that the IZ0-815 exam is a lot tougher. While covering more basic topics, the exam is at the same level of difficulty as the OCP 7 and OCP 8 exams.

In this introduction, we will cover important information about the exam before moving on to information about this book. Finally, this introduction ends with an assessment test so that you can see how much studying lays ahead of you.

Understanding the Exam

At the end of the day, the exam is a list of questions. The more you know about the structure of the exam, the better you are likely to do. For example, knowing how many questions the exam contains allows you to manage your progress and time remaining better. In this section, we discuss the details of the exam, along with some history of previous certification exams.

Choosing Which Exam to Take

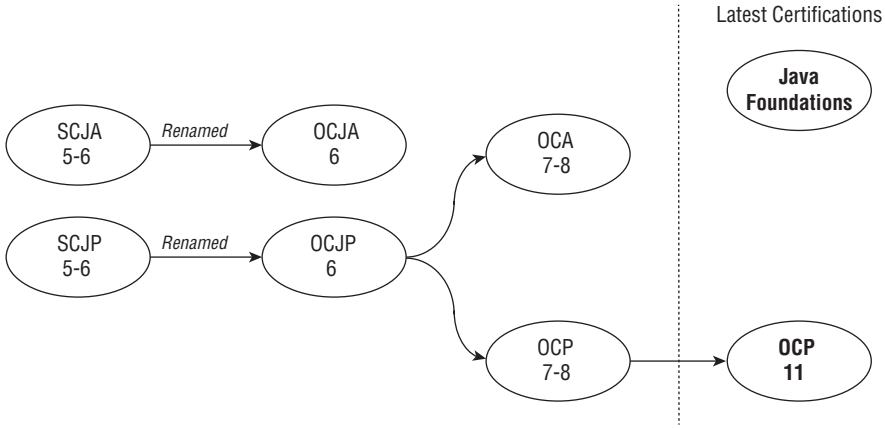
Java is about 25 years old, celebrating being "born" in 1995. As with anything 25 years old, there is a good amount of history and variation between different versions of Java. Over the years, the certification exams have changed to cover different topics. The names of the exams have even changed.

Oracle released two exams each for Java 7 and Java 8. The first exam tended to be easier and completing it granted you the title of Oracle Certified Associate (OCA). The second exam was a lot more difficult, with much longer questions, and completing it granted you the title of Oracle Certified Professional (OCP).

Oracle did not release an exam for Java 9 or Java 10, probably because neither of these are Long Term Support (LTS) releases (more on that in Chapter 1, "Welcome to Java"). With Java 11, Oracle decided to discontinue both the OCA certification and its associated exam. You still have to take two exams to earn an OCP title. There's also a basic Java Foundations exam that we will describe shortly.

Figure I.1 shows these past and current Java certifications. This image is helpful if you run into material online that references older exams. It is also helpful if you have an older certification and are trying to determine where it fits in.

FIGURE I.1 Past and current Java certifications



The first exam, and the one this book is designed to prepare you for, is the 1Z0-815 Programmer I exam. It covers a lot of basic Java properties including class structure, methods, inheritance, and modules. It is somewhat similar, but significantly more difficult, than the previous OCA 7/8 exams. If you've taken a previous OCA exam, it might help to think of the 1Z0-815 exam as containing much of the same OCA content, but with the level of difficulty of the original OCP exam. This means questions are longer, answers often have multiple parts, and the level of depth of the material is significantly more difficult.

The second exam is the 1Z0-816 Programmer II exam. It is quite similar to the previous OCP 7/8 exams, with a number of new topics such as annotations, modules, and security added in. We've included notes throughout this book on some topics that aren't in scope for the 1Z0-815 exam but will be when you study for the 1Z0-816 exam.

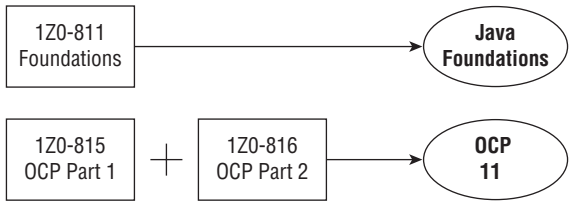
Oracle has also released a 1Z0-817 OCP Upgrade Exam for those who hold an existing Sun Certified Programmer 6 (SCJP 6), OCP 6, OCP 7, or OCP 8 title. The objectives for the upgrade exam are quite similar to the 1Z0-816 Programmer II exam.

Oracle also offers a 1Z0-811 Java Foundations exam. This is often for a novice programmer or nonprogrammers. If you are planning to take the Java Foundations exam, this book prepares you as well. You will get to skip some parts of the book, so be sure to read the objectives/chapter mapping later in this introduction. The Java Foundations exam is an easier exam but does not serve as a prerequisite for the OCP certification. If you are considering taking the Java Foundations exam, please see the linked blog post from our book page to weigh the pros and cons of each exam:

`http://www.selikoff.net/ocp11-1`

Figure I.2 reviews the exams you need to take in order to earn the latest Java certifications. This book will prepare you for your choice of the 1Z0-815 and the 1Z0-811 exams.

FIGURE I.2 Latest Java certification exams



Broad Objectives

In previous certification exams, the list of exam objectives tended to include specific topics, classes, and APIs that you needed to know for the exam. For example, take a look at a previous objective for the 1Z0-808 (OCA 8) exam:

> *Compare and contrast the features and components of Java such as: platform independence, object orientation, encapsulation, etc.*

Now compare it with the equivalent objective for the 1Z0-815 exam:

> *Identify key features of the Java language*

Notice the difference? The older version is more detailed and describes specific topics you will need to understand. The newer version is a lot vaguer. It also gives the exam writers a lot more freedom to, say, insert a new feature without having to update the list of objectives.

So, how do you know what to study? By reading this study guide, of course! We've spent years studying the certification exams, in all of their forms, and have carefully cultivated topics, material, and practice questions that we are confident can lead to successfully passing the exam.

Changes to the Exam

At the time of this book being published, all three OCP 11 certification exams contain 80 questions and have a duration of 3 hours. The 1Z0-815 and 1Z0-816 exams require a passing score of 63%, while the 1Z0-817 exam requires a passing score of 61%. The 1Z0-811 Java Foundation exam is a little different than the OCP exams. It contains 75 questions and has a duration of 2.5 hours, and it requires a score of 65% to pass.

Oracle has a tendency to fiddle with the length of the exam and the passing score once it comes out. Oracle also likes to "tweak" the exam topics over time. It wouldn't be a surprise for Oracle to make minor changes to the exam objectives, the number of questions, or the passing score after this book goes to print.

If there are any changes to the exam after this book is published, we will note them on the book page of our blog:

`http://www.selikoff.net/ocp11-1`

Exam Questions

The 1Z0-815 exam consists of multiple-choice questions. There are between four and seven possible answers. If a question has more than one answer, the question specifically states exactly how many correct answers there are. This book does not do that. We say "Choose all that apply" to make the questions harder. This means the questions in this book are generally harder than those on the exam. The idea is to give you more practice so you can spot the correct answer more easily on the real exam.

If you read about older versions of the exam online, you might see references to drag-and-drop questions. These questions had you do a puzzle on how to complete a piece of code. Luckily, these are no longer on the exam.

Many of the questions on the exam are code snippets rather than full classes. Saving space by not including imports leaves room for lots of other code. In Chapter 1, we provide advice on reading code in various formats.

Out-of-Scope Material

When you take the exam, you may see some questions that appear to be out of scope. *Don't panic!* Oftentimes, these questions do not require knowing anything about the topic to answer the question. For example, after reading this book you should be able to spot that the following does not compile, even if you have no idea what `LocalDate` and `ChronoUnit` are:

```
final LocalDate holiday = LocalDate.now();
holiday = LocalDate.now().plus(5,ChronoUnit.HOURS);
```

While the classes and enums used in this question are not in scope for the exam, the reason it does not compile is. In particular, you should know that you cannot reassign a variable marked `final`.

See, not so scary is it? Expect to see at least a few structures on the exam that you are not familiar with. If they aren't part of your exam preparation material, then you don't need to understand them to answer the question.

Question Topic Tips

The following list of topics is meant to give you an idea of the types of questions and oddities that you might come across on the exam. Being aware of these categories of such questions will help you get a higher score on the exam.

Questions with Extra Information Provided Imagine the question includes a statement that `XMLParseException` is a checked exception. It's fine if you don't know what an `XMLParseException` is or what XML is for that matter. (If you are wondering, it is a format for data.) This question is a gift. You know the question is about checked and unchecked exceptions.

Questions with Embedded Questions To answer some questions on the exam, you may have to actually answer two or three subquestions. For example, the question may contain two blank lines, and the question may ask you to choose the two answers that fill in each blank. In some cases, the two answer choices are not related, which means you're really answering multiple questions, not just one! Another place this is seen is in a question that includes a `print()` statement that outputs multiple variables. Each question has to be tracked independently. These questions are among the most difficult and time-consuming on the exam because they contain multiple, often independent, questions to answer. Unfortunately, the exam does not give partial credit, so take care when answering questions like these.

Questions with Unfamiliar APIs Suppose a question shows a method with a `Path` parameter. If you see a class or method that wasn't covered in this book, assume it works as you would expect. Some of these APIs you might come across, such as `LocalDate`, were on the Java 8 exam and are not part of the Java 11 exams. Assume that the part of the code using that API is correct and look very hard for other errors.

Questions with Unfamiliar Concepts You might see some more advanced Java concepts like an `enum` or inner classes that use aspects not covered in this book. While you need to know more for the 1Z0-816 exam, the 1Z0-815 only tests the basics of these features. Again, you can assume the unfamiliar provided code is correct and the question is testing something else.

Questions with Made Up or Incorrect Concepts In the context of a word problem, the exam may bring up a term or concept that does not make any sense such as saying an interface inherits from a class, which is not a correct statement. In other case, they may use a keyword that does not exist in Java, like `struct`. For these, you just have to read them carefully and recognize when the exam is using invalid terminology.

Questions That Are Really Out of Scope When introducing new questions, Oracle includes them as unscored questions at first. This allows them to see how real exam takers do without impacting your score. You will still receive the number of questions as the exam lists. However, a few of them may not count. These unscored questions may contain out-of-scope material or even errors. They will not be marked as unscored, so you still have to do your best to answer them. Follow the previous advice to assume that anything you haven't seen before is correct. That will cover you if the question is being counted!

Reading This Book

It might help to have some idea about how this book has been written. This section contains details about some of the common structures and features you will find in this book, where to go for additional help, and how to obtain bonus material for this book.

Who Should Buy This Book

If you want to become certified as a Java programmer, this book is definitely for you. If you want to acquire a solid foundation in Java and your goal is to prepare for the exam, this book is also for you. You'll find clear explanations of the concepts you need to grasp and plenty of help to achieve the high level of professional competency you need in order to succeed in your chosen field.

This book is intended to be understandable to anyone who has a tiny bit of Java knowledge. If you've never read a Java book before, we recommend starting with a book that teaches programming from the beginning and then returning to this study guide.

This book is for anyone from high school students to those beginning their programming journey to experienced professionals who need a review for the certification.

How This Book Is Organized

This book consists of 11 chapters plus supplementary information: an Appendix, a glossary (online), this introduction, and the bonus exam. You might have noticed that there are more than 11 exam objectives. We organized what you need to know to make it easy to learn and remember. Each chapter begins with a list of the objectives that are covered in that chapter.

The chapters are organized as follows:

Chapter 1: Welcome to Java describes the basics of Java such as how to run a program. It also includes the benefits of Java and key terminology.

Chapter 2: Java Building Blocks focuses on variables such as primitives and object data types and scoping variables. It also discusses garbage collection.

Chapter 3: Operators explains operations with variables. It also talks about casting and the precedence of operators.

Chapter 4: Making Decisions covers on core logical constructs such as conditionals and loops.

Chapter 5: Core Java APIs introduces you to `String`, `StringBuilder`, array, and various types.

Chapter 6: Lambdas and Functional Interfaces shows how use lambdas and four key functional interfaces. The focus is implementing and calling `Predicate`, `Consumer`, `Supplier`, and `Comparator`.

Chapter 7: Methods and Encapsulation explains how to write methods. It also shows the four access modifiers.

Chapter 8: Class Design covers constructors and superclasses. It also includes method overriding.

Chapter 9: Advanced Class Design adds interfaces and abstract classes. It also introduces inner classes.

Chapter 10: Exceptions shows the different types of exception classes and how to use them. It also includes different uses of `try` statements.

Chapter 11: Modules details the benefits of the new module feature. It shows how to compile and run module programs from the command line.

At the end of each chapter, you'll find a few elements you can use to prepare for the exam.

Summary This section reviews the most important topics that were covered in the chapter and serves as a good review.

Exam Essentials This section summarizes highlights that were covered in the chapter. You should be able to convey the information requested.

Review Questions Each chapter concludes with at least 20 review questions. You should answer these questions and check your answers against the ones provided in the Appendix. If you can't answer at least 80% of these questions correctly, go back and review the chapter, or at least those sections that seem to be giving you difficulty.

The review questions, assessment test, and other testing elements included in this book are *not* derived from the real exam questions, so don't memorize the answers to these questions and assume that doing so will enable you to pass the exam. You should learn the underlying topic, as described in the text of the book. This will let you answer the questions provided with this book *and* pass the exam. Learning the underlying topic is also the approach that will serve you best in the workplace—the ultimate goal of a certification.

To get the most out of this book, you should read each chapter from start to finish before going to the chapter-end elements. They are most useful for checking and reinforcing your understanding. Even if you're already familiar with a topic, you should skim the chapter. There are a number of subtleties to Java that you could easily not encounter even when working with Java for years.

Conventions Used in This Book

This book uses certain typographic styles to help you quickly identify important information and to avoid confusion over the meaning of words such as on-screen prompts. In particular, look for the following styles:

- *Italicized text* indicates key terms that are described at length for the first time in a chapter. (Italics are also used for emphasis.)

- `A monospaced font` indicates code or command-line text.
- *`Italicized monospaced text`* indicates a variable.

In addition to these text conventions, which can apply to individual words or entire paragraphs, a few conventions highlight segments of text.

A note indicates information that's useful or interesting. It is often something to pay special attention to for the exam.

Sidebars

A sidebar is like a note but longer. The information in a sidebar is useful, but it doesn't fit into the main flow of the text.

Real World Scenario

Real-World Scenario

A real-world scenario is a type of sidebar that describes a task or an example that's particularly grounded in the real world. This is something that is useful in the real world but is not going to show up on the exam.

Getting Help

Both of the authors are moderators at `CodeRanch.com`. This site is a quite large and active programming forum that is very friendly toward Java beginners. It has a forum just for this exam called Programmer Certification. It also has a forum called Beginning Java for non-exam-specific questions. As you read the book, feel free to ask your questions in either of those forums. It could be you are having trouble compiling a class or that you are just plain confused about something. You'll get an answer from a knowledgeable Java programmer. It might even be one of us.

Interactive Online Learning Environment and Test Bank

We've put together some really great online tools to help you pass the IZ0-815 exam. The interactive online learning environment that accompanies this study guide provides a test bank and study tools to help you prepare for the exam. By using these tools you can dramatically increase your chances of passing the exam on your first try.