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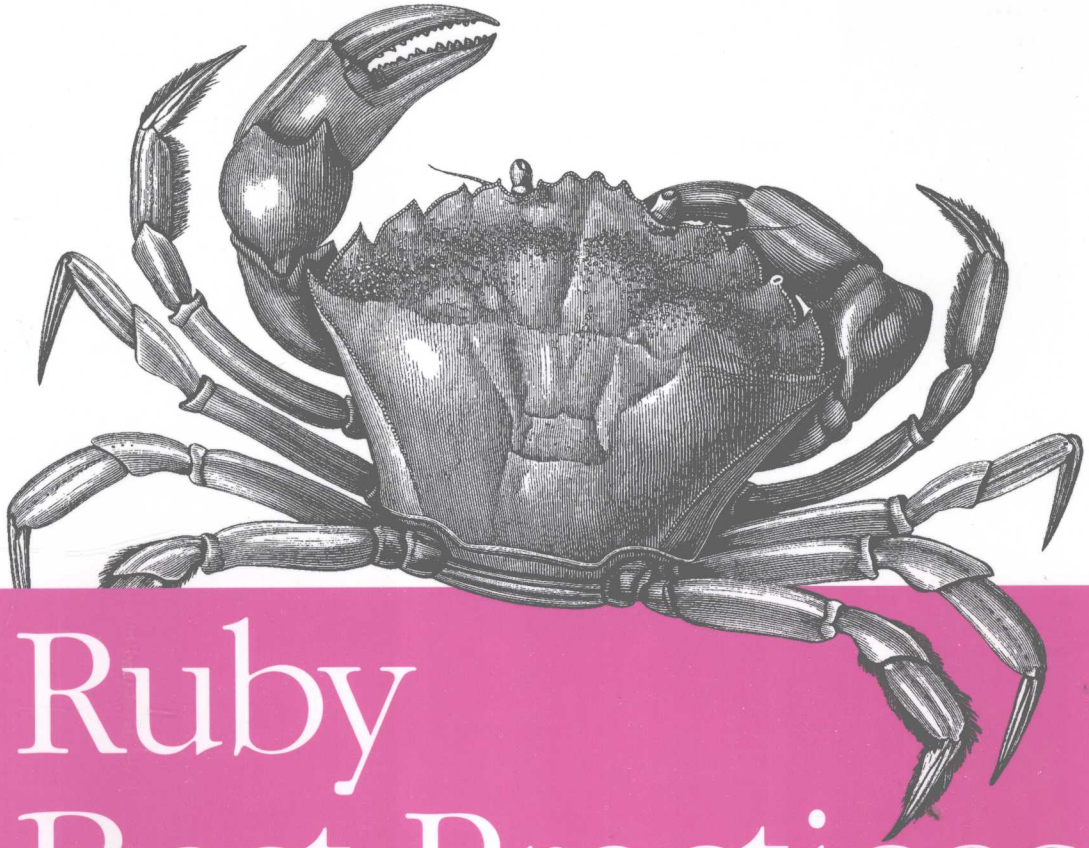

Ruby Best Practices

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Yukihiro Matsumoto 序

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Ruby最佳实践(影印版)

你能够编写真正优雅的Ruby代码吗？《Ruby最佳实践》正是为想要像专家那样使用Ruby的程序员所准备的。本书由Ruby项目Prawn的开发者所著，简洁地向你阐释如何使用Ruby编写优美的应用程序接口和领域特定语言。此外，还包括如何应用函数式编程的思想和技术，使代码更简洁，使你更有效率。通过本书，你将会学到如何编写可读性更高，表达能力更强的代码，以及许多其他方面的内容。

《Ruby最佳实践》将会帮助你：

- 理解Ruby代码块所蕴含的神秘力量
- 学习如何在不破坏原有Ruby代码的情况下进行调整，例如运行时在模块内糅合
- 探究测试与调试中的细节，以及如何从易测性出发进行设计
- 学习通过让事情保持简单来编写快速代码
- 用于文本处理和文件管理的开发策略，包括正则表达式
- 理解为什么会发生错误以及错误是如何发生的
- 利用Ruby的多语言特性减少文化障碍

本书还包含多个章节对测试代码、设计应用程序接口以及项目维护做了全面介绍。《Ruby最佳实践》将陪伴你学习如何将这门丰富、优美的语言发挥到极致。

“这是一本极为务实的著作，各层次的开发人员都能从中借鉴。”

——Brad Ediger，Madriska Media Group的领袖开发者，同时也是《Advanced Rails》（O'Reilly）的作者

“终于有这样一本书问世了，它不仅教我如何使用Ruby，更教会我如何正确地使用它。每位Ruby爱好者的书架上都该摆上一本《Ruby最佳实践》。”

——Jeremy McAnally，ENTP开发者，同时还是《Ruby in Practice》（Manning）一书的作者

“我敢打赌，通过阅读这本书，你一定学到了可以提高Ruby编程能力的新技巧。”

——James Edward Gray II，代码忍者及Ruby 1.9的CSV标准库的作者

Gregory T. Brown是康涅狄格州纽黑文市的一位Ruby爱好者，他的大多数时间都花在了与Ruby语言相关的自由软件项目上。他是Ruport的原作者，并且是Prawn的作者，该Ruby库被用来生成PDF文档。

Ruby语言创造者松本行弘为本书作序。

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Preface

Some programming languages excel at turning coders into clockwork oranges. By enforcing rigid rules about how software must be structured and implemented, it is possible to prevent a developer from doing anything dangerous. However, this comes at a high cost, stifling the essential creativity and passion that separates the masterful coder from the mediocre. Thankfully, Ruby is about as far from this bleak reality as you can possibly imagine.

As a language, Ruby is designed to allow developers to express themselves freely. It is meant to operate at the programmer's level, shifting the focus away from the machine and toward the problem at hand. However, Ruby is highly malleable, and is nothing more than putty in the hands of the developer. With a rigid mindset that tends to overcomplicate things, you will produce complex Ruby code. With a light and unencumbered outlook, you will produce simple and beautiful programs. In this book, you'll be able to clearly see the difference between the two, and find a clear path laid out for you if you choose to seek the latter.

A dynamic, expressive, and open language does not fit well into strict patterns of proper and improper use. However, this is not to say that experienced Rubyists don't agree on general strategies for attacking problems. In fact, there is a great degree of commonality in the way that professional Ruby developers approach a wide range of challenges. My goal in this book has been to curate a collection of these techniques and practices while preserving their original context. Much of the code discussed in this book is either directly pulled from or inspired by popular open source Ruby projects, which is an ideal way to keep in touch with the practical world while still studying what it means to write better code.

If you were looking for a book of recipes to follow, or code to copy and paste, you've come to the wrong place. This book is much more about how to go about solving problems in Ruby than it is about the exact solution you should use. Whenever someone asks the question "What is the right way to do this in Ruby?", the answer is always "It depends." If you read this book, you'll learn how to go with the flow and come up with good solutions even as everything keeps changing around you. At this point, Ruby stops being scary and starts being beautiful, which is where all the fun begins.

Audience

This book isn't really written with the Ruby beginner in mind, and certainly won't be very useful to someone brand new to programming. Instead, I assume a decent technical grasp of the Ruby language and at least some practical experience in developing software with it. However, you needn't be some guru in order to benefit from this book. The most important thing is that you actually care about improving the way you write Ruby code.

As long as you have at least an intermediate level of experience, reading through the book should be enjoyable. You'll want to have your favorite reference book handy to look things up as needed. Either *The Ruby Programming Language (http://oreilly.com/catalog/9780596516178/)* by David Flanagan and Yukihiro Matsumoto (O'Reilly) or *Programming Ruby*, Third Edition, by Dave Thomas (Pragmatic Bookshelf) should do the trick.

It is also important to note that this is a Ruby 1.9 book. It makes no attempt to provide notes on the differences between Ruby 1.8 and 1.9 except for in a brief appendix designed specifically for that purpose. Although many of the code samples will likely work with little or no modifications for earlier versions of Ruby, Ruby 1.9 is the way forward, and I have chosen to focus on it exclusively in this book. Although the book may still be useful to those maintaining legacy code, it is admittedly geared more toward the forward-looking crowd.

About This Book

This book is designed to be read by chapter, but the chapters are not in any particular order. The book is split into two parts, with eight chapters forming its core and three appendixes included as supplementary material. Despite the fact that you can read these topics in any order that you'd like, it is recommended that you read the entire book. Lots of the topics play off of each other, and reading through them all will give you a solid base in some powerful Ruby techniques and practices.

Each of the core chapters starts off with a case study that is meant to serve as an introduction to the topic it covers. Every case study is based on code from real Ruby projects, and is meant to provide a practical experience in code reading and exploration. The best way to work through these examples is to imagine that you are working through a foreign codebase with a fellow developer, discussing the interesting bits as you come across them. In this way, you'll be able to highlight the exciting parts without getting bogged down on every last detail. You are not expected to understand every line of code in the case studies in this book, but instead should just treat them as useful exercises that prepare you for studying the underlying topics.

Once you've worked your way through the case study, the remainder of each core chapter fills in details on specific subtopics related to the overall theme. These tend to

mix real code in with some abstract examples, preferring the former but falling back to the latter when necessary to keep things easy to understand. Some code samples will be easy to run as they are listed; others might only be used for illustration purposes. This should be easy enough to figure out as you go along based on the context. I wholeheartedly recommend running examples when they're relevant and stopping frequently to conduct your own explorations as you read this book. The sections are kept somewhat independent of one another to make it easy for you to take as many breaks as you need, and each wraps up with some basic reminders to refresh your memory of what you just read.

Although the core chapters are the essential part of this book, the appendixes should not be overlooked. You'll notice that they're slightly different in form and content from the main discussion, but maintain the overall feel of the book. You'll get the most out of them if you read them after you've completed the main part of the book, as they tend to assume that you're already familiar with the rest of the content.

That's pretty much all there is to it. The key things to remember are that you aren't going to get much out of this book by skimming for content on a first read, and that you should keep your brain engaged while you work your way through the content. If you read this entire book without writing any code in the process, you'll probably rob yourself of the full experience. So pop open your favorite editor, start with the topic from the chapter listing that interests you most, and get hacking!

Conventions Used in This Book

The following typographical conventions are used in this book:

Italic
: Indicates new terms, URLs, email addresses, filenames, and file extensions.

`Constant width`
: Used for program listings, as well as within paragraphs to refer to program elements such as variable or function names, databases, data types, environment variables, statements, and keywords.

`Constant width bold`
: Shows commands or other text that should be typed literally by the user.

`Constant width italic`
: Shows text that should be replaced with user-supplied values or by values determined by context.

Using Code Examples

This book is here to help you get your job done. In general, you may use the code in this book in your programs and documentation. You do not need to contact us for permission unless you're reproducing a significant portion of the code. For example,

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Acknowledgments

Over the course of writing *Ruby Best Practices*, I was thoroughly supported by my friends, family, and fellow hackers. I want to thank each and every one of the folks who've helped out with this book, because it would not exist without them.

This book did not have a typical technical review process, but instead was supported by an excellent advisory board whose members participated in group discussion and the occasional review as each chapter was released. These folks not only helped catch technical errors, but helped me sketch out the overall vision for how the book should come together as well. Participants included James Britt, Francis Hwang, Hart Larew, Chris Lee, Jeremy McAnally, and Aaron Patterson.

Rounding out the group was the best pair of guiding mentors I could hope for, Brad Ediger and James Edward Gray II. Both have published Ruby books, and have worked with me extensively on a number of Ruby projects. James and Brad were both instrumental in producing this book, and to my career as a software developer in general. I have learned a ton from each of them, and thanks to their help with *RBP*, I can now pass their knowledge on to you.

Much of the source code in this book comes from the open source Ruby community. Although I talk about my own projects (Prawn and Ruport) a lot, most of the code I show is actually from other contributors or at least originated from good ideas that came up in mailing list discussions, feature requests, and so on. In addition to these two projects, I also have benefited from studying a whole slew of other gems, including but not limited to: activesupport, builder, camping, faker, flexmock, gibberish, haml, highline, lazy, nokogiri, pdf-writer, and rspec. Great thanks go out to all of the developers of these projects, whom I've tried to acknowledge directly wherever I can throughout the text.

Of course, without Yukihiro Matsumoto (Matz), we wouldn't have Ruby in the first place. After writing this book, I am more impressed than ever by the language he has designed. If I'm lucky, this book will help show people just how beautiful Ruby can be.

Producing the technical content for this work was daunting, but only part of the overall picture. My editor, Mike Loukides, and the entire O'Reilly production team have made publishing this book a very comfortable experience. After overcoming major fears about the hurdles of working with a mainstream publisher, I've found the folks at O'Reilly to be helpful, accommodating, and supportive. It is especially nice that this book will become an open community resource less than a year after it prints. This

measure is one I hope to see other technical book publishers adopt, and one I'm very thankful that O'Reilly was open to.

Finally, I need to thank the folks who've helped me keep my sanity while working on this huge project. My future wife, Jia Wu, has been amazingly supportive of me, and helped make sure that I occasionally ate and slept while working on this book. On the weekends, we'd usually escape for an bit and spend time with my close friends and family. Though they didn't have anything to do with the project itself, without Pete, Paul, Mom, Dad, and Vinny, I doubt you'd be reading this book right now. Thanks to all of you, even if you'll never need to read this book.

So many people helped out in countless different ways, that I'm sure I've missed someone important while compiling this list. To make sure these folks get their well-deserved credit, please keep an eye on the acknowledgments page at *http://rubybestpractices.com* and let me know if there is someone who needs to be added to the list. But for now, if I've failed to list you here, thank you and please know that I've not forgotten what you've done to help me.

Foreword

In 1993, when Ruby was born, Ruby had nothing. No user base except for me and a few close friends. No tradition. No idioms except for a few inherited from Perl, though I regretted most of them afterward.

But the language forms the community. The community nourishes the culture. In the last decade, users increased—hundreds of thousands of programmers fell in love with Ruby. They put great effort into the language and its community. Projects were born. Idioms tailored for Ruby were invented and introduced. Ruby was influenced by Lisp and other functional programming languages. Ruby formed relationships between technologies and methodologies such as test-driven development and duck typing.

This book introduces a map of best practices of the language as of 2009. I've known Greg Brown for years, and he is an experienced Ruby developer who has contributed a lot of projects to the language, such as Ruport and Prawn. I am glad he compiled his knowledge into this book.

His insights will help you become a better Ruby programmer.

—Yukihiro "Matz" Matsumoto
June 2009, Japan

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CHAPTER 1
Driving Code Through Tests

If you've done some Ruby—even a little bit—you have probably heard of *test-driven development* (TDD). Many advocates present this software practice as the "secret key" to programming success. However, it's still a lot of work to convince people that writing tests that are often longer than their implementation code can actually lower the total time spent on a project and increase overall efficiency.

In my work, I've found most of the claims about the benefits of TDD to be true. My code is better because I write tests that document the expected behaviors of my software while verifying that my code is meeting its requirements. By writing automated tests, I can be sure that once I narrow down the source of a bug and fix it, it'll never resurface without me knowing right away. Because my tests are automated, I can hand my code off to others and mechanically assert my expectations, which does more for me than a handwritten specification ever could do.

However, the important thing to take home from this is that automated testing is really no different than what we did before we discovered it. If you've ever tried to narrow down a bug with a print statement based on a conditional, you've already written a primitive form of automated testing:

```
if foo != "blah"
  puts "I expected 'blah' but foo contains #{foo}"
end
```

If you've ever written an example to verify that a bug exists in an earlier version of code, but not in a later one, you've written something not at all far from the sorts of things you'll write through TDD. The only difference is that one-off examples do not adequately account for the problems that can arise during integration with other modules. This problem can become huge, and is one that unit testing frameworks handle quite well.

Even if you already know a bit about testing and have been using it in your work, you might still feel like it doesn't come naturally. You write tests because you see the long-term benefits, but you usually write your code first. It takes you a while to write your tests, because it seems like the code you wrote is difficult to pin down behavior-wise.

In the end, testing becomes a necessary evil. You appreciate the safety net, but except for when you fall, you'd rather just focus on keeping your balance and moving forward.

Masterful Rubyists will tell you otherwise, and for good reason. Testing may be hard, but it truly does make your job of writing software easier. This chapter will show you how to integrate automated testing into your workflow, without forcing you to relearn the troubleshooting skills you've already acquired. By making use of the best practices discussed here, you'll be able to more easily see the merits of TDD in your own work.

A Quick Note on Testing Frameworks

Ruby provides a unit testing framework in its standard library called *minitest/unit*. This library provides a user-level compatibility layer with the popular *test/unit* library, which has been fairly standard in the Ruby community for some time now. There are significant differences between the *minitest/unit* and *test/unit* implementations, but as we won't be building low-level extensions in this chapter, you can assume that the code here will work in both *minitest/unit* and *test/unit* without modification.

For what it's worth, I don't have a very strong preference when it comes to testing frameworks. I am using the `Test::Unit` API here because it is part of standard Ruby, and because it is fundamentally easy to hack on and extend. Many of the existing alternative testing frameworks are built on top of `Test::Unit`, and you will almost certainly need to have a working knowledge of it as a Ruby developer. However, if you've been working with a noncompatible framework such as RSpec (*http://rspec.info*), there's nothing wrong with that. The ideas here should be mostly portable to your framework of choice.

And now we can move on. Before digging into the nuts and bolts of writing tests, we'll examine what it means for code to be easily testable, by looking at some real examples.

Designing for Testability

Describing testing with the phrase "Red, Green, Refactor" makes it seem fairly straightforward. Most people interpret this as the process of writing some failing tests, getting those tests to pass, and then cleaning up the code without causing the tests to fail again. This general assumption is exactly correct, but a common misconception is how much work needs to be done between each phase of this cycle.

For example, if we try to solve our whole problem all in one big chunk, add tests to verify that it works, then clean up our code, we end up with implementations that are very difficult to test, and even more challenging to refactor. The following example illustrates just how bad this problem can get if you're not careful. It's from some payroll management code I wrote in a hurry a couple of years ago: