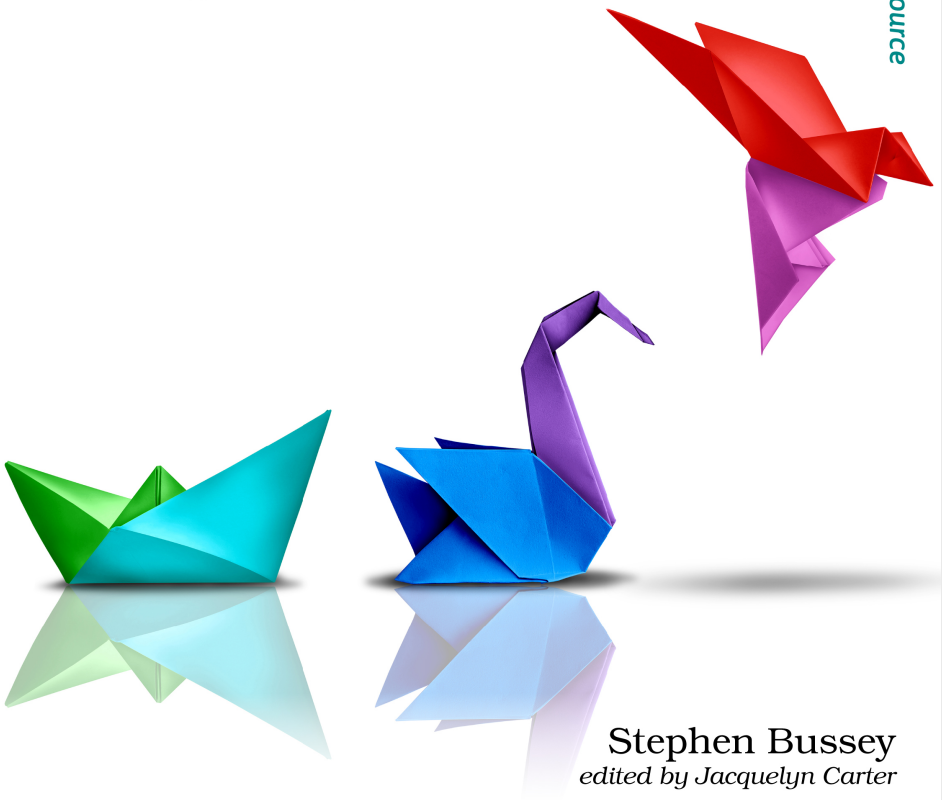
The Pragmatic Programmers

Your Elixir Source

From Ruby to Elixir

Unleash the Full Potential of Functional Programming



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Elixir has emerged over the past few years as a "most loved" language[1] that's used by many businesses and hobbyists to write reliable software systems. Many Elixirists consider it their superpower of productivity and stability. Hopefully, by the end of this book, you'll see why this is the case.

It's hard to learn a new language, harder to become production-ready with it, and even harder still to convince your boss to actually let you use the new language in production. The juice is worth the squeeze, though. Elixir opens a new way of thinking about programming that carries over into other languages as well.

Your knowledge of Ruby influences how you view and write in other programming languages. Similarly, as you develop an understanding of Elixir, it will also influence how you think when writing code. Even if you were to never use Elixir in production, you'll still benefit and grow as a programmer.

We'll start this chapter by taking a look at what makes Ruby such a great language. You'll see why Elixir is a similarly great language and why its future is bright. You'll learn about the technology that Elixir is built on top of: Erlang, OTP, and the BEAM. Finally, you'll write a bit of Elixir code and run it on your computer.

Before we talk about Elixir, let's talk about Ruby.

The Joy of Ruby

Some people have pitted Elixir as being "against Ruby," but that's not the case. When you learn a new language, it doesn't have to come with a reduced respect for what you used in the past. It also doesn't mean that you can't use that language anymore. Especially with the rise of microservices, it's possible that you can program in Ruby and Elixir at the same company!

Ruby is a language founded with joy at its core, which leads to several non-technical aspects that make it an appealing language: a healthy foundational philosophy, a strong community, and continual improvement. Let's go over each point and how it benefits Ruby.

Solid Foundations

Yukihiro Matsumoto (Matz) created Ruby with a philosophy that programmers who use it should feel joy. To this day, his philosophy influences the design of the language, the way that libraries are built, and everything about Ruby.

1. https://survey.stackoverflow.co/2022/#technology-most-loved-dreaded-and-wanted

The happiness of programmers is just as important as what those programmers create because happiness affects all aspects of one's life. Businesses benefit from this as well. A happy programmer is more likely to be happy with their job, stay with their company, and create a better product.

A Strong Community

Matz's philosophy is felt in the community and is captured in the phrase "Matz is nice, so we are nice" or MINSWAN.[2] The Ruby community is welcoming and helpful, which is critical for the adoption of a language over time. New developers won't want to learn a language if they are pushed away due to negativity.

Another strength of the Ruby community is a culture of testing. This might be obvious to people who have spent a lot of time with Ruby, but it's certainly not true in all language communities. Having a culture of testing creates better libraries and applications. This testing culture contributes to joy over time.

Continual Improvement

Ruby isn't a static language. The language doesn't push many breaking changes (this would certainly not elicit joy), but it has continued to evolve. Many smart people and companies deliver performance improvements, increased security, and even large projects like type checking.

Plus, Ruby's major libraries have continued to innovate over the years. Ruby on Rails 7[3] is the best release of Rails yet. It continues to set a high bar for programmer productivity and happiness.

The continued improvements to Ruby guarantee relevance for Ruby developers. Ruby isn't going anywhere, and it isn't a goal of this book to try to replace Ruby with Elixir.

Next, let's explore a bit of what makes Elixir special.

The Case for Elixir

Anytime you pick a new technology, you'll have to make a case for it. The first consideration is your personal decision of whether you want to spend time learning the language. Next, you'll need to bring it to your professional peers and get their buy-in that they also want to spend time learning it. Finally, your business will need to make the case of whether they want to invest in

2. https://en.wiktionary.org/wiki/MINASWAN
3. https://rubyonrails.org/

it. Even if you're just a hobbyist who is curious about Elixir, you still need to justify learning it over other languages.

The technical aspects of a language are obviously important in these decisions, but the nontechnical aspects are just as important. In the previous section, we spent a lot of time talking about the nontechnical aspects that make Ruby a joy to use and learn.

We'll briefly cover a few nontechnical strengths of Elixir, but we'll also look at why the technology itself is appealing.

Nontechnical Strengths

Elixir is small and relatively new. These are two things that you'll be working against when you make the case for it. However, Elixir finds strength in its community, innovation, and philosophy.

Close-Knit Community

The Elixir Forums[4] and Elixir Slack[5] are a wealth of knowledge and friendly faces. It's rare that a question goes unanswered in these places because the community shows up to help.

Culture of Testing

Elixir, like Ruby, has a healthy testing culture that permeates every layer of the technical stack. It's rare to find untested libraries.

Language Design Philosophy

Elixir doesn't have a vocalized philosophy like Ruby does, but it's clear that it's influenced by other languages. Elixir's creator, José Valim[6], has talked about being inspired by Ruby, Clojure, and Erlang. In fact, José was on the Rails Core Team, as well as the team that created the popular Devise library.

Elixir's language syntax is pleasant to use and elicits joy, much like Ruby's. For example, the Elixir core team works hard to avoid breaking changes—you can usually upgrade Elixir versions without too much work. That creates joy when upgrading from one version to another—an otherwise notoriously painful task.

4. https://elixirforum.com
5. https://elixir-slack.community/
6. https://twitter.com/josevalim

Continual Innovation

Over the past few years, a ton of innovative features and libraries have been added to the Elixir ecosystem. These have been developed by the core team but also by private companies developing edge-pushing libraries.

The most well-known innovations in this space are Phoenix LiveView,[7] machine learning with Nx,[8] and hardware development with Nerves.[9]

A healthy foundation wouldn't matter if the technical aspects weren't also strong. Let's look at why Elixir is appealing for modern application development.

A Solid Foundation with the BEAM

Elixir is a functional programming language that's built on top of an almost forty-year-old foundation, the BEAM (Bogdan/Björn's Erlang Abstract Machine). We'll be going into what that is in the next section, but for now the important takeaway is that it's a unique runtime that empowers parallelism and fault tolerance in a way that isn't common in other languages.

The combination of fault tolerance and isolation is a premier strength of Elixir and the BEAM. Errors are going to happen, whether they are bugs, service outages, or anything in between. The BEAM provides ways for us to determine how errors should affect our application. Do you want an error to bring down the whole thing? Do you want an error to only affect the request that it was serving? Do you want to restart a piece of your system when an error occurs? Select the failure mode of your application so your application behaves predictably when things go wrong.

It's human nature to focus on the happy path. When evaluating a programming language, that would mean evaluating how you code in it, the libraries you use, and how data flows through your system. But the unhappy path is just as (or sometimes more!) important. Elixir and the BEAM provide a core foundation for programming the unhappy path you want, rather than taking whatever you get.

Technical Benefits

Elixir applications can fully utilize their host CPU cores (parallelism) without having to write complex code. It's possible for other languages to achieve this same level of parallelism, but the unique aspect is how simple it is to achieve this with Elixir—it's nearly free.

7. https://github.com/phoenixframework/phoenix_live_view
8. https://github.com/elixir-nx
9. https://www.nerves-project.org/

It's easy to overlook the impact of this. If your web application is served on a 4-core server and you increase it to an 8-core server, you'll likely get twice the throughput out of it without making any changes. Despite it seeming like it should be common in other languages, it's not. Many languages (including Ruby) become bound as the server size grows, and applications can't utilize all of their cores when that happens.

Parallelism is crucial for modern programming, but the opposite of parallelism is just as important—serial code. Elixir provides excellent ways to control when code executes in parallel and when it executes serially.

The combination of parallel and serial code gives you complete control over your system runtime performance. This is unmatched in almost any other programming language today. Elixir (and BEAM languages) are equipped with these world-class capabilities out of the box.

Elixir is well-suited for building reliable, modern systems. This especially applies to web systems, but Elixir can be used in hardware systems, communication systems, machine learning, and more. You'll write more performant systems that are cheaper to run when you use Elixir.

These are only a few of the technical benefits of Elixir. A lot of Elixir's greatest strengths come from its foundation with Erlang and the BEAM. Let's dive into what those are next.