

The  
Pragmatic  
Programmers

# Programming Phoenix LiveView

Interactive Elixir Web Programming  
Without Writing Any JavaScript



Bruce A. Tate and Sophie DeBenedetto  
*edited by Jacquelyn Carter*

# Programming Phoenix

**Godfrey Smart, Jens Langeland-  
Knudsen**



## **Programming Phoenix:**

Programming Phoenix 1.4 Chris McCord, Bruce Tate, Jose Valim, 2019-10-02 Don't accept the compromise between fast and beautiful you can have it all Phoenix creator Chris McCord Elixir creator Jose Valim and award winning author Bruce Tate walk you through building an application that's fast and reliable At every step you'll learn from the Phoenix creators not just what to do but why Packed with insider insights and completely updated for Phoenix 1.4 this definitive guide will be your constant companion in your journey from Phoenix novice to expert as you build the next generation of web applications Phoenix is the long awaited web framework based on Elixir the highly concurrent language that combines a beautiful syntax with rich metaprogramming The best way to learn Phoenix is to code and you'll get to attack some interesting problems Start working with controllers views and templates within the first few pages Build an in memory context and then back it with an Ecto database layer complete with changesets and constraints that keep readers informed and your database integrity intact Craft your own interactive application based on the channels API for the real time applications that this ecosystem made famous Write your own authentication plugs and use the OTP layer for supervised services Organize code with modular umbrella projects This edition is fully updated for Phoenix 1.4 with a new chapter on using Channel Presence to find out who's connected even on a distributed application Use the new generators and the new ExUnit features to organize tests and make Ecto tests concurrent This is a book by developers and for developers and we know how to help you ramp up quickly Any book can tell you what to do When you've finished this one you'll also know why to do it What You Need To work through this book you will need a computer capable of running Erlang 18 or higher Elixir 1.5 or higher and Phoenix 1.4 or higher A rudimentary knowledge of Elixir is also highly recommended

*Programming Phoenix 1.4* Chris McCord, 2019 Don't accept the compromise between fast and beautiful you can have it all Phoenix creator Chris McCord Elixir creator Jose Valim and award winning author Bruce Tate walk you through building an application that's fast and reliable At every step you'll learn from the Phoenix creators not just what to do but why Packed with insider insights and completely updated for Phoenix 1.4 this definitive guide will be your constant companion in your journey from Phoenix novice to expert as you build the next generation of web applications Phoenix is the long awaited web framework based on Elixir the highly concurrent language that combines a beautiful syntax with rich metaprogramming The best way to learn Phoenix is to code and you'll get to attack some interesting problems Start working with controllers views and templates within the first few pages Build an in memory context and then back it with an Ecto database layer complete with changesets and constraints that keep readers informed and your database integrity intact Craft your own interactive application based on the channels API for the real time applications that this ecosystem made famous Write your own authentication plugs and use the OTP layer for supervised services Organize code with modular umbrella projects This edition is fully updated for Phoenix 1.4 with a new chapter on using Channel Presence to find out who's connected even on a distributed application Use the new generators and the new

ExUnit features to organize tests and make Ecto tests concurrent This is a book by developers and for developers and we know how to help you ramp up quickly Any book can tell you what to do When you've finished this one you'll also know why to do it What You Need To work through this book you will need a computer capable of running Erlang 18 or higher Elixir 1.5 or higher and Phoenix 1.4 or higher A rudimentary knowledge of Elixir is also highly recommended *Programming Phoenix* Chris McCord, Bruce Tate, Jose Valim, 2016-04-20 Don't accept the compromise between fast and beautiful you can have it all Phoenix creator Chris McCord Elixir creator Jose Valim and award winning author Bruce Tate walk you through building an application that's fast and reliable At every step you'll learn from the Phoenix creators not just what to do but why Packed with insider insights this definitive guide will be your constant companion in your journey from Phoenix novice to expert as you build the next generation of web applications Phoenix is the long-awaited web framework based on Elixir the highly concurrent language that combines a beautiful syntax with rich metaprogramming The authors who developed the earliest production Phoenix applications will show you how to create code that's easier to write test understand and maintain The best way to learn Phoenix is to code and you'll get to attack some interesting problems Start working with controllers views and templates within the first few pages Build an in-memory repository and then back it with an Ecto database layer Learn to use change sets and constraints that keep readers informed and your database integrity intact Craft your own interactive application based on the channels API for the real-time high-performance applications that this ecosystem made famous Write your own authentication components called plugs and even learn to use the OTP layer for monitored reliable services Organize your code with umbrella projects so you can keep your applications modular and easy to maintain This is a book by developers and for developers and we know how to help you ramp up quickly Any book can tell you what to do When you've finished this one you'll also know why to do it What You Need To work through this book you will need a computer capable of running Erlang 17 or better Elixir 1.1 or better Phoenix 1.0 or better and Ecto 1.0 or better A rudimentary knowledge of Elixir is also highly recommended *Programming Ecto* Darin Wilson, Eric Meadows-Jonsson, 2019-04-01 Languages may come and go but the relational database endures Learn how to use Ecto the premier database library for Elixir to connect your Elixir and Phoenix apps to databases Get a firm handle on Ecto fundamentals with a module-by-module tour of the critical parts of Ecto Then move on to more advanced topics and advice on best practices with a series of recipes that provide clear step-by-step instructions on scenarios commonly encountered by app developers Co-authored by the creator of Ecto this title provides all the essentials you need to use Ecto effectively Elixir and Phoenix are taking the application development world by storm and Ecto the database library that ships with Phoenix is going right along with them There are plenty of examples that show you the basics but to use Ecto to its full potential you need to learn the library from the ground up This definitive guide starts with a tour of the core features of Ecto repos queries schemas changesets transactions gradually building your knowledge with tasks of ever-increasing complexity Along the way you'll be learning by

doing a sample application handles all the boilerplate so you can focus on getting Ecto into your fingers Build on that core knowledge with a series of recipes featuring more advanced topics Change your pooling strategy to maximize your database's efficiency Use nested associations to handle complex table relationships Add streams to handle large result sets with ease Based on questions from Ecto users these recipes cover the most common situations developers run into Whether you're new to Ecto or already have an app in production this title will give you a deeper understanding of how Ecto works and help make your database code cleaner and more efficient

**What You Need To follow along with the book you should have Erlang OTP 19 and Elixir 1.4 installed** The book will guide you through setting up a sample application that integrates Ecto

**Learn**

**Functional Programming with Elixir** Ulisses Almeida, 2018-02-23 Elixir's straightforward syntax and this guided tour give you a clean simple path to learn modern functional programming techniques No previous functional programming experience required This book walks you through the right concepts at the right pace as you explore immutable values and explicit data transformation functions modules recursive functions pattern matching high order functions polymorphism and failure handling all while avoiding side effects Don't board the Elixir train with an imperative mindset To get the most out of functional languages you need to think functionally This book will get you there Functional programming offers useful techniques for building maintainable and scalable software that solves today's difficult problems The demand for software written in this way is increasing you don't want to miss out In this book you'll not only learn Elixir and its features you'll also learn the mindset required to program functionally Elixir's clean syntax is excellent for exploring the critical skills of using functions and concurrency Start with the basic techniques of the functional way working with immutable data transforming data in discrete steps and avoiding side effects Next take a deep look at values expressions functions and modules Then extend your programming with pattern matching and flow control with case if cond and functions Use recursive functions to create iterations Work with data types such as lists tuples and maps Improve code reusability and readability with Elixir's most common high order functions Explore how to use lazy computation with streams design your data and take advantage of polymorphism with protocols Combine functions and handle failures in a maintainable way using Elixir features and libraries Learn techniques that matter to make code that lives harmoniously with the language

**What You Need** You'll need a computer and Elixir 1.4 or newer version installed No previous functional programming or Elixir experience is required Some experience with any programming language is recommended

*Functional Programming: A PragPub Anthology* Michael Swaine, 2017-07-20 Explore functional programming and discover new ways of thinking about code You know you need to master functional programming but learning one functional language is only the start In this book through articles drawn from PragPub magazine and articles written specifically for this book you'll explore functional thinking and functional style and idioms across languages Led by expert guides you'll discover the distinct strengths and approaches of Clojure Elixir Haskell Scala and Swift and learn which best suits your needs Contributing authors Rich Hickey Stuart Halloway Aaron

Bedra Michael Bevilacqua Linn Venkat Subramaniam Paul Callaghan Jose Valim Dave Thomas Natasha Murashev Tony Hillerson Josh Chisholm and Bruce Tate Functional programming is on the rise because it lets you write simpler cleaner code and its emphasis on immutability makes it ideal for maximizing the benefits of multiple cores and distributed solutions So far nobody s invented the perfect functional language each has its unique strengths In Functional Programming A PragPub Anthology you ll investigate the philosophies tools and idioms of five different functional programming languages See how Swift the development language for iOS encourages you to build highly scalable apps using functional techniques like map and reduce Discover how Scala allows you to transition gently but deeply into functional programming without losing the benefits of the JVM while with Lisp based Clojure you can plunge fully into the functional style Learn about advanced functional concepts in Haskell a pure functional language making powerful use of the type system with type inference and type classes And see how functional programming is becoming more elegant and friendly with Elixir a new functional language built on the powerful Erlang base The industry has been embracing functional programming more and more driven by the need for concurrency and parallelism This collection of articles will lead you to mastering the functional approach to problem solving So put on your explorer s hat and prepare to be surprised The goal of exploration is always discovery What You Need Familiarity with one or more programming languages

[Programming Phoenix](#) Chris McCord. Bruce Tate. Jose Valim,2016

**Software Estimation Without Guessing** George Dinwiddie,2019-12-19 Estimating software development often produces more angst than value but it doesn t have to Identify the needs behind estimate requests and determine how to meet those needs simply and easily Choose estimation techniques based on current needs and available information gaining benefit while reducing cost and effort Detect bad assumptions that might sink your project if you don t adjust your plans Discover what to do when an estimate is wrong how to recover and how to use that knowledge for future planning Learn to communicate about estimates in a healthy and productive way maximizing advantage to the organization and minimizing damage to the people In a world where most developers hate estimation and most managers fear disappointment with the results there is hope for both It requires giving up some widely held misconceptions Let go of the notion that an estimate is an estimate and estimate for the particular need you and your organization have Realize that estimates have a limited shelf life and reestimate frequently if it s important When reality differs from your estimate don t lament mine that disappointment for the gold that can be the longer term jackpot Estimate in comparison to past experience by modeling the work mathematically or a hybrid of both Learn strategies for effective decomposition of work and aspects of the work that likely affect your estimates Hedge your bets by comparing the results of different approaches Find out what to do when an estimate proves wrong And they will They re estimates after all You ll discover that you can use estimates to warn you of danger so you can take appropriate action in time Learn some crucial techniques to understand and communicate with those who need to understand Address both the technical and sociological aspects of estimation and you ll help your organization

achieve its desired goals with less drama and more benefit What You Need No software needed just your past experience and concern for the outcomes **Genetic Algorithms and Machine Learning for Programmers** Frances

Buontempo,2019-01-23 Self driving cars natural language recognition and online recommendation engines are all possible thanks to Machine Learning Now you can create your own genetic algorithms nature inspired swarms Monte Carlo simulations cellular automata and clusters Learn how to test your ML code and dive into even more advanced topics If you are a beginner to intermediate programmer keen to understand machine learning this book is for you Discover machine learning algorithms using a handful of self contained recipes Build a repertoire of algorithms discovering terms and approaches that apply generally Bake intelligence into your algorithms guiding them to discover good solutions to problems In this book you will Use heuristics and design fitness functions Build genetic algorithms Make nature inspired swarms with ants bees and particles Create Monte Carlo simulations Investigate cellular automata Find minima and maxima using hill climbing and simulated annealing Try selection methods including tournament and roulette wheels Learn about heuristics fitness functions metrics and clusters Test your code and get inspired to try new problems Work through scenarios to code your way out of a paper bag an important skill for any competent programmer See how the algorithms explore and learn by creating visualizations of each problem Get inspired to design your own machine learning projects and become familiar with the jargon What You Need Code in C C 11 Python 2 x or 3 x and JavaScript using the HTML5 canvas Also uses matplotlib and some open source libraries including SFML Catch and Cosmic Ray These plotting and testing libraries are not required but their use will give you a fuller experience Armed with just a text editor and compiler interpreter for your language of choice you can still code along from the general algorithm descriptions *Computerworld* ,1986-04-14 For more than 40 years Computerworld has been the leading source of technology news and information for IT influencers worldwide Computerworld s award winning Web site Computerworld com twice monthly publication focused conference series and custom research form the hub of the world s largest global IT media network *Property-Based Testing with PropEr, Erlang, and Elixir* Fred Hebert,2019-01-17 Property based testing helps you create better more solid tests with little code By using the PropEr framework in both Erlang and Elixir this book teaches you how to automatically generate test cases test stateful programs and change how you design your software for more principled and reliable approaches You will be able to better explore the problem space validate the assumptions you make when coming up with program behavior and expose unexpected weaknesses in your design PropEr will even show you how to reproduce the bugs it found With this book you will be writing efficient property based tests in no time Most tests only demonstrate that the code behaves how the developer expected it to behave and therefore carry the same blind spots as their authors when special conditions or edge cases show up Learn how to see things differently with property tests written in PropEr Start with the basics of property tests such as writing stateless properties and using the default generators to generate test cases automatically More importantly learn how to think in

properties Improve your properties write IPS data generators and discover what your code can or cannot do Learn when to use property tests and when to stick with example tests with real world sample projects Explore various testing approaches to find the one that s best for your code Shrink failing test cases to their simpler expression to highlight exactly what breaks in your code and generate highly relevant data through targeted properties Uncover the trickiest bugs you can think of with nearly no code at all with two special types of properties based on state transitions and finite state machines Write Erlang and Elixir properties that generate the most effective tests you ll see whether they are unit tests or complex integration and system tests What You Need Basic knowledge of Erlang optionally Elixir For Erlang tests Erlang OTP 20 0 with Rebar 3 4 0 For Elixir tests Erlang OTP 20 0 Elixir 1 5 0 [The Ray Tracer Challenge](#) Jamis Buck,2019-02-26 Brace yourself for a fun challenge build a photorealistic 3D renderer from scratch It s easier than you think In just a couple of weeks build a ray tracer that renders beautiful scenes with shadows reflections brilliant refraction effects and subjects composed of various graphics primitives spheres cubes cylinders triangles and more With each chapter implement another piece of the puzzle and move the renderer that much further forward Do all of this in whichever language and environment you prefer and do it entirely test first so you know it s correct Recharge yourself with this project s immense potential for personal exploration experimentation and discovery The renderer is a ray tracer which means it simulates the physics of light by tracing the path of light rays around your scene Each exciting chapter presents a bite sized piece of the puzzle building on earlier chapters and setting the stage for later ones Requirements are given in plain English which you translate into tests and code When the project is complete look back and realize you ve built an entire system test first There s no research necessary all the necessary formulas and algorithms are presented and illustrated right here Dive into intriguing topics from fundamental concepts such as vectors and matrices to the algorithms that simulate the intersection of light rays with spheres planes cubes cylinders and triangles to geometric patterns such as checkers and rings Lighting and shading effects such as shadows and reflections make your scenes come to life and constructive solid geometry CSG enables you to combine your graphics primitives in simple ways to produce complex shapes Play and experiment as you discover the fun of writing a ray tracer Accept the challenge today What You Need Aside from a computer operating system and programming environment you ll need a way to display PPM image files On Windows programs like Photoshop will work or free programs like IrfanView On Mac no special software is needed as Preview can open PPM files [Agile Web Development with Rails 6](#) Sam Ruby,David B. Copeland,Dave Thomas,2020-02-10 Learn Rails the way the Rails core team recommends it along with the tens of thousands of developers who have used this broad far reaching tutorial and reference If you re new to Rails you ll get step by step guidance If you re an experienced developer get the comprehensive insider information you need for the latest version of Ruby on Rails The new edition of this award winning classic is completely updated for Rails 6 and Ruby 2 6 with information on system testing Webpack and advanced JavaScript Ruby on Rails helps you produce high quality beautiful

looking web applications quickly you concentrate on creating the application and Rails takes care of the details Rails 6 brings many improvements and this edition is updated to cover the new features and changes in best practices We start with a step by step walkthrough of building a real application and in depth chapters look at the built in Rails features Follow along with an extended tutorial as you write a web based store application Eliminate tedious configuration and housekeeping seamlessly incorporate Ajax and JavaScript send and receive emails manage background jobs with ActiveJob and build real time features using WebSockets and ActionCable Test your applications as you write them using the built in unit integration and system testing frameworks internationalize your applications and deploy your applications easily and securely New in this edition is coverage of Action Mailer which allows you to receive emails in your app as well as ActionText a zero configuration rich text editing feature Rails 1.0 was released in December 2005 This book was there from the start and didn't just evolve alongside Rails it evolved with Rails It has been developed in consultation with the Rails core team In fact Rails itself is tested against the code in this book What You Need All you need is a Windows Mac OS X or Linux machine to do development on This book will take you through the steps to install Rails and its dependencies If you aren't familiar with the Ruby programming language this book contains a chapter that covers the basics necessary to understand the material in the book

**Programming Phoenix LiveView** Bruce A. Tate, Sophie DeBenedetto, 2021-09-30 The days of the traditional request response web application are long gone but you don't have to wade through oceans of JavaScript to build the interactive applications today's users crave The innovative Phoenix LiveView library empowers you to build applications that are fast and highly interactive without sacrificing reliability This definitive guide to LiveView isn't a reference manual Learn to think in LiveView Write your code layer by layer the way the experts do Explore techniques with experienced teachers to get the best possible performance Instead of settling for traditional manuals and tutorials get insights that can only be learned from experience Start with the Elixir language techniques that effortlessly marry your client templates and server side handlers Design your systems with the right layers in the right places so that your code is easier to understand change and support Explore features like multi part uploads and learn how to comprehensively test your live views Roll into advanced techniques to tie your code to other services through the powerful publish subscribe interface LiveView brings the most important programming techniques from the popular Elm and JavaScript React frameworks to Elixir You'll experience firsthand how to harness that power by working side by side with some of the first LiveView users You will write your programs to change data on the server and you'll see how LiveView efficiently detects those changes and reflects them on the web page Start from scratch use built in generators and craft reusable components Your single purpose reducers will transform server data that your renderers can turn into efficient client side diffs Don't settle for knowing how things work To get the most out of LiveView you need to know why they work that way Co authored by one of the most prolific authors and teachers in all of Elixir this book is your perfect guide to one of the most important new frameworks of our generation What You Need

Programming Phoenix LiveView uses Phoenix version 1.5 and any Elixir version compatible with it. You will also want PostgreSQL and JavaScript Node.

*Phoenix in Action* Geoffrey Lessel, 2019-04-26 Summary Phoenix is a modern web framework built for the Elixir programming language. Elegant, fault-tolerant, and performant, Phoenix is as easy to use as Rails and as rock-solid as Elixir's Erlang-based foundation. Phoenix in Action builds on your existing web dev skills, teaching you the unique benefits of Phoenix along with just enough Elixir to get the job done. Foreword by Sasa Juric, author of Elixir in Action. Second Edition. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications.

About the Technology Modern web applications need to be efficient, to develop lightning-fast and unfailingly reliable Phoenix, a web framework for the Elixir programming language, delivers on all counts. Elegant and intuitive, Phoenix radically simplifies the dev process. Built for concurrency, Phoenix channels make short work of developing real-time applications. And, as for reliability, Phoenix apps run on the battle-tested Erlang VM, so they're rock-solid.

About the Book Phoenix in Action is an example-based book that teaches you to build production-quality web apps. You'll handle business logic, database interactions, and app designs as you progressively create an online auction site. As you go, you'll build everything from the core components to the real-time user interactions where Phoenix really shines.

What's Inside Functional programming in a web environment. An introduction to Elixir. Database interactions with Ecto. Real-time communication with channels.

About the Reader For web developers familiar with a framework like Rails or ASP.NET. No experience with Elixir or Phoenix required.

About the Author Geoffrey Lessel is a seasoned web developer who speaks and blogs about Elixir and Phoenix.

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Computerworld, 1981-08-24 For more than 40 years, Computerworld has been the leading source of technology news and information for IT influencers worldwide. Computerworld's award-winning Web site, Computerworld.com, twice monthly publication, focused conference series, and custom research form the hub of the world's largest global IT media network.

**Phoenix Web Development** Mike Voloz, Brandon Richey, 2018-04-30 The Phoenix web development framework is an object-oriented application development tool written in Elixir. With Elixir and Phoenix, you build your application the right way, ready to scale and ready for the increasing demands of real-time web applications. If you have some knowledge of Elixir, have experience with web frameworks in other

**Adopting Elixir** Ben Marx, Jose Valim, Bruce Tate, 2018-03-14 Adoption is more than programming. Elixir is an exciting new language, but to successfully get your application from start to finish, you're going to need to know more than just the language. The case studies and strategies in this book will get you there. Learn the best practices for the whole life of your application, from design and team building to managing stakeholders.

to deployment and monitoring Go beyond the syntax and the tools to learn the techniques you need to develop your Elixir application from concept to production Learn real life strategies from the people who built Elixir and use it successfully at scale See how Ben Marx and Bleacher Report maintain one of the highest traffic Elixir applications by selling the concept to management and delivering on that promise Find out how Bruce Tate and icanmakeitbetter hire and train Elixir engineers and the techniques they've employed to design and ensure code consistency since Elixir's early days Explore IPaaS challenges in deploying and monitoring distributed applications with Elixir creator Jose Valim and Plataformatec Make a business case and build a team before you finish your first prototype Once you're in development form strategies for organizing your code and learning the constraints of the runtime and ecosystem Convince stakeholders both business and technical about the value they can expect Prepare to make the critical early decisions that will shape your application for years to come Manage your deployment with all of the knobs and gauges that good DevOps teams demand Decide between the many options available for deployment and how to best prepare yourself for the challenges of running a production application This book picks up where most Elixir books leave off It won't teach you to program Elixir or any of its tools Instead it guides you through the broader landscape and shows you a holistic approach to adopting the language What You Need This book works with any version of Elixir

*Designing Elixir Systems With OTP* James Edward Gray II, Bruce A. Tate, 2019-12-02 You know how to code in Elixir now learn to think in it Learn to design libraries with intelligent layers that shape the right data structures flow from one function into the next and present the right APIs Embrace the same OTP that's kept our telephone systems reliable and fast for over 30 years Move beyond understanding the OTP functions to knowing what's happening under the hood and why that matters Using that knowledge instinctively know how to design systems that deliver fast and resilient services to your users all with an Elixir focus Elixir is gaining mindshare as the programming language you can use to keep your software running forever even in the face of unexpected errors and an ever growing need to use more processors This power comes from an effective programming language an excellent foundation for concurrency and its inheritance of a battle tested framework called the OTP If you're using frameworks like Phoenix or Nerves you're already experiencing the features that make Elixir an excellent language for today's demands This book shows you how to go beyond simple programming to designing and that means building the right layers Embrace those data structures that work best in functional programs and use them to build functions that perform and compose well layer by layer across processes Test your code at the right place using the right techniques Layer your code into pieces that are easy to understand and heal themselves when errors strike Of all Elixir's boons the most important one is that it guides us to design our programs in a way to most benefit from the architecture that they run on The experts do it and now you can learn to design programs that do the same What You Need Elixir Version 1.7 or greater

**Programmer Passport: Elixir** Bruce Tate, 2022-06-22 Elixir is a functional language that crosses many boundaries With a syntax borrowing heavily from Ruby a runtime that is on the

Erlang BEAM a macro system like that in Lisp and a streaming library like you might find in Haskell Elixir takes the best features from many environments Elixir borrows from Erlang's Let It Crash philosophy and adds significant improvements with structs first class hygienic macros and abstractions such as protocols Many of these ideas were borrowed from other communities and they make a big difference in language adoption This book gives you a quick guided tour through the fascinating world of Elixir Explore Elixir with the author of Seven Languages in Seven Weeks In this fast paced book first published with Groxio's Programmer Passport you'll discover how Elixir's fantastic documentation clear error messages and excellent tooling make it approachable and easy to work with Learn about techniques other books skip like writing your own Mix task and discover several blind spots that beginning and intermediate Elixir developers encounter Effective Elixir depends on getting the most out of the most common datatypes explore the most important ones before using them to write modules and different kinds of functions Learn when to choose tuples maps or lists in your programs and the most effective ways to access lists Understand the differences between maps and keyword lists Learn the primitives Elixir uses to start multiple processes and send messages between them You'll finish the book by dabbling with the advanced techniques of streams sigils and macros Find out what Groxio IPSers already know The assistance of an experienced guide will help you learn Elixir more quickly than you could without one What You Need You'll need Elixir version 1.12 or greater

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### **Programming Phoenix Introduction**

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