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# Clojure Reactive Programming

Design and implement highly reusable reactive applications by integrating different frameworks with Clojure

Leonardo Borges

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# Clojure Reactive Programming How To Develop Concurrent And Asynchronous Applications With Clojure

**Eduardo Diaz, Shantanu Kumar, Akhil  
Wali**



## **Clojure Reactive Programming How To Develop Concurrent And Asynchronous Applications With Clojure:**

Hands-On Reactive Programming with Clojure Konrad Szydlo, Leonardo Borges, 2019-01-25 Learn how to use RxClojure to deal with stateful computations Key Features Leverage the features of Functional Reactive Programming using Clojure Create dataflow based systems that are the building blocks of Reactive Programming Use different Functional Reactive Programming frameworks techniques and patterns to solve real world problems Book Description Reactive Programming is central to many concurrent systems and can help make the process of developing highly concurrent event driven and asynchronous applications simpler and less error prone This book will allow you to explore Reactive Programming in Clojure 1 9 and help you get to grips with some of its new features such as transducers reader conditionals additional string functions direct linking and socket servers Hands On Reactive Programming with Clojure starts by introducing you to Functional Reactive Programming FRP and its formulations as well as showing you how it inspired Compositional Event Systems CES It then guides you in understanding Reactive Programming as well as learning how to develop your ability to work with time varying values thanks to examples of reactive applications implemented in different frameworks You ll also gain insight into some interesting Reactive design patterns such as the simple component circuit breaker request response and multiple master replication Finally the book introduces microservices based architecture in Clojure and closes with examples of unit testing frameworks By the end of the book you will have gained all the knowledge you need to create applications using different Reactive Programming approaches What you will learn Understand how to think in terms of time varying values and event streams Create compose and transform observable sequences using Reactive extensions Build a CES framework from scratch using core async as its foundation Develop a simple ClojureScript game using Reagi Integrate Om and RxJS in a web application Implement a reactive API in Amazon Web Services AWS Discover helpful approaches to backpressure and error handling Get to grips with futures and their applications Who this book is for If you re interested in using Reactive Programming to build asynchronous and concurrent applications this is the book for you Basic knowledge of Clojure programming is necessary to understand the concepts covered in this book *Clojure Reactive Programming* Leonardo Borges, 2015-03-23 If you are a Clojure developer who is interested in using Reactive Programming to build asynchronous and concurrent applications this book is for you Knowledge of Clojure and Leiningen is required Basic understanding of ClojureScript will be helpful for the web chapters although it is not strictly necessary Hands-on Reactive Programming with Clojure Konrad Szydlo, Leonardo Borges, 2019 Reactive Programming is central to many concurrent systems and can help make the process of developing highly concurrent event driven and asynchronous applications simpler and less error prone This book will allow you to explore Reactive Programming in Clojure 1 9 and help you get to grips with some of its new features such as transducers reader conditionals additional string functions direct linking and socket servers Hands On Reactive Programming with Clojure starts by introducing you to Functional Reactive

Programming FRP and its formulations as well as showing you how it inspired Compositional Event Systems CES It then guides you in understanding Reactive Programming as well as learning how to develop your ability to work with time varying values thanks to examples of reactive applications implemented in different frameworks You ll also gain insight into some interesting Reactive design patterns such as the simple component circuit breaker request response and multiple master replication Finally the book introduces microservices based architecture in Clojure and closes with examples of unit testing frameworks By the end of the book you will have gained all the knowledge you need to create applications using different Reactive Programming approaches

Clojure Reactive Programming Leonardo Borges,2015-03-23 If you are a Clojure developer who is interested in using Reactive Programming to build asynchronous and concurrent applications this book is for you Knowledge of Clojure and Leiningen is required Basic understanding of ClojureScript will be helpful for the web chapters although it is not strictly necessary

*Mastering Clojure* Akhil Wali,2016-03-28 Understand the philosophy of the Clojure language and dive into its inner workings to unlock its advanced features methodologies and constructs About This Book Learn to handle data using sequences reducers and transducers in Clojure Explore the lesser known and more advanced features constructs and methodologies of the Clojure language and its ecosystem such as asynchronous channels actors logic programming and reactive programming Sharpen your Clojure skills through illustrative and comprehensive examples Who This Book Is For If you re looking to learn more about the core libraries and dive deep into the Clojure language then this book is ideal for you Prior knowledge of the Clojure language is required What You Will Learn Maximize the impact of parallelization functional composition and process transformation by composing reducers and transducers Process and manipulate data using sequences reducers and transducers in Clojure Modify and add features to the Clojure language using macros Explore the features of category theory and custom data sources for logic programming in Clojure Orchestrate parallelism and concurrency using built in primitives as well as community libraries in Clojure Handle data with asynchronous and reactive programming methodologies and leverage it using the core async library Test your code with unit tests specs and type checks to write testable code Troubleshoot and style your Clojure code to make it more maintainable In Detail Clojure is a general purpose language from the Lisp family with an emphasis on functional programming It has some interesting concepts and features such as immutability gradual typing thread safe concurrency primitives and macro based metaprogramming which makes it a great choice to create modern performant and scalable applications Mastering Clojure gives you an insight into the nitty gritty details and more advanced features of the Clojure programming language to create more scalable maintainable and elegant applications You ll start off by learning the details of sequences concurrency primitives and macros Packed with a lot of examples you ll get a walkthrough on orchestrating concurrency and parallelism which will help you understand Clojure reducers and we ll walk through composing transducers so you know about functional composition and process transformation inside out We also explain how reducers and transducers can be used to handle data

in a more performant manner Later on we describe how Clojure also supports other programming paradigms such as pure functional programming and logic programming Furthermore you ll level up your skills by taking advantage of Clojure s powerful macro system Parallel asynchronous and reactive programming techniques are also described in detail Lastly we ll show you how to test and troubleshoot your code to speed up your development cycles and allow you to deploy the code faster Style and approach This is an easy to follow project based guide that throws you directly into the excitement of Clojure code Mastering Clojure is for anyone who is interested in expanding their knowledge of language features and advanced functional programming

*Mastering Concurrency Programming with Java 9* Javier Fernandez Gonzalez, 2017-07-17 Master the principles to make applications robust scalable and responsive About This Book Implement concurrent applications using the Java 9 Concurrency API and its new components Improve the performance of your applications and process more data at the same time taking advantage of all of your resources Construct real world examples related to machine learning data mining natural language processing and more Who This Book Is For This book is for competent Java developers who have basic understanding of concurrency but knowledge of effective implementation of concurrent programs or usage of streams for making processes more efficient is not required What You Will Learn Master the principles that every concurrent application must follow See how to parallelize a sequential algorithm to obtain better performance without data inconsistencies and deadlocks Get the most from the Java Concurrency API components Separate the thread management from the rest of the application with the Executor component Execute phased based tasks in an efficient way with the Phaser components Solve problems using a parallelized version of the divide and conquer paradigm with the Fork Join framework Find out how to use parallel Streams and Reactive Streams Implement the map and reduce and map and collect programming models Control the concurrent data structures and synchronization mechanisms provided by the Java Concurrency API Implement efficient solutions for some actual problems such as data mining machine learning and more In Detail Concurrency programming allows several large tasks to be divided into smaller sub tasks which are further processed as individual tasks that run in parallel Java 9 includes a comprehensive API with lots of ready to use components for easily implementing powerful concurrency applications but with high flexibility so you can adapt these components to your needs The book starts with a full description of the design principles of concurrent applications and explains how to parallelize a sequential algorithm You will then be introduced to Threads and Runnables which are an integral part of Java 9 s concurrency API You will see how to use all the components of the Java concurrency API from the basics to the most advanced techniques and will implement them in powerful real world concurrency applications The book ends with a detailed description of the tools and techniques you can use to test a concurrent Java application along with a brief insight into other concurrency mechanisms in JVM Style and approach This is a complete guide that implements real world examples of algorithms related to machine learning data mining and natural language processing in client server environments All the

examples are explained using a step by step approach Clojurerl Programming on the BEAM William Smith,2025-08-19 Clojurerl Programming on the BEAM Clojurerl Programming on the BEAM is an authoritative guide to harnessing the power of modern functional programming on the Erlang virtual machine Through a comprehensive exploration of both foundational topics and advanced system design this book positions Clojurerl as a compelling language for building robust scalable and fault tolerant applications Readers are introduced to the BEAM architecture Clojurerl s origins and the practicalities of installing configuring and optimizing their development environments for maximum productivity Delving deeply into language features the text unpacks Clojurerl s Lisp inspired syntax data immutability macros and the unique way it brings BEAM native pattern matching and fault tolerant constructs into the Clojure ecosystem Advanced chapters guide the reader through sophisticated topics such as concurrency parallelism OTP design patterns and seamless interoperability with other BEAM languages and native code empowering developers to integrate Clojurerl into complex distributed polyglot systems The final sections address the real world demands of distributed systems high performance applications testing deployment and observability Through detailed case studies rigorous testing and debugging strategies and forward looking discussions on language evolution and community best practices the book provides not only practical know how but also strategic insights for the future of functional programming on the BEAM Whether you are a BEAM veteran or new to the ecosystem Clojurerl Programming on the BEAM is an indispensable resource for building robust scalable systems with confidence

**Clojure Applied** Ben Vandgrift,Alex Miller,2015-08-27 Think in the Clojure way Once you re familiar with Clojure take the next step with extended lessons on the best practices and most critical decisions you ll need to make while developing Learn how to model your domain with data transform it with pure functions manage state spread your work across cores and structure apps with components Discover how to use Clojure in the real world and unlock the speed and power of this beautiful language on the Java Virtual Machine Clojure Applied gives you the practical realistic advice and depth of field that s been missing from your development practice You want to develop software in the most effective efficient way possible This book gives you the answers you ve been looking for in friendly clear language Dive into the core concepts of Clojure immutable collections concurrency pure functions and state management You ll finally get the complete picture you ve been looking for rather than dozens of puzzle pieces you must assemble yourself First explore the core concepts of Clojure development learn how to model your domain with immutable data choose the ideal collection and write simple pure functions for efficient transformation Next you ll apply those core concepts to build applications discover how Clojure manages state and identity spread your work for concurrent programming and create and assemble components Finally see how to manage external integration and deployment concerns by developing a testing strategy connecting with other data sources and getting your libraries and applications out the door Go beyond the toy box and into Clojure s way of thinking By the end of this book you ll have the tools and information to put Clojure s strengths to work What You Need To follow along

with the examples in the book you will need Clojure 1.6, Leiningen 2 and Java 6 or higher

**Reactive with ClojureScript Recipes** Nicolas Modrzyk, 2017-09-28 Use ClojureScript to create powerful serverless Web applications that are responsive and engaging This book presents Reactive recipes with Reagent a ClojureScript reactive framework to create interactive applications Throughout the book Reactive with ClojureScript Recipes uses progressively more complex examples and introduces you to a set of powerful tools that target rapid web application development In the last chapter you'll use these concepts for an HTML5 based deployment to smart phones ClojureScript is your functional programming language for the web ClojureScript looks like a LISP and compiles to JavaScript and thus runs nicely in the browser What You'll Learn Write simple static web apps with Boot Integrate ClojureScript and its libraries Animate content play with sound and videos Use Reagent and be Reactive in the browser Run your Application on a smart phones Who This Book Is For Clojure developers who want to turn their functional skills to the web and JavaScript advanced developers who want to reuse their web skills in a different language

**Reactive Streams in Java** Adam L. Davis, 2018-11-29 Get an easy introduction to reactive streams in Java to handle concurrency data streams and the propagation of change in today's applications This compact book includes in depth introductions to RxJava Akka Streams and Reactor and integrates the latest related features from Java 9 and 11 as well as reactive streams programming with the Android SDK Reactive Streams in Java explains how to manage the exchange of stream data across an asynchronous boundary passing elements on to another thread or thread pool while ensuring that the receiving side is not forced to buffer arbitrary amounts of data which can reduce application efficiency After reading and using this book you'll be proficient in programming reactive streams for Java in order to optimize application performance and improve memory management and data exchanges What You Will Learn Discover reactive streams and how to use them Work with the latest features in Java 9 and Java 11 Apply reactive streams using RxJava Program using Akka Streams Carry out reactive streams programming in Android Who This Book Is For Experienced Java programmers

**Mastering Clojure: An Essential Guide to Functional Programming Basics** Adam Jones, 2025-01-02 Unlock the power of functional programming with Mastering Clojure An Essential Guide to Functional Programming Basics your definitive resource for conquering the Clojure language Whether you're a newcomer to programming or a seasoned developer eager to expand your expertise this book provides an in depth exploration of Clojure's foundational concepts and vibrant ecosystem Embark on your Clojure journey with precise insightful explanations covering everything from setting up your development environment to crafting sophisticated web applications Delve into Clojure's innovative data structures functional programming principles concurrency and parallelism Master state and identity management within your applications handle errors efficiently and debug with confidence Discover the seamless integration of Clojure with Java tapping into the extensive Java ecosystem for your projects Through practical examples expert advice and targeted tutorials Mastering Clojure equips you to write efficient elegant code harnessing the full potential of functional programming Embrace

the journey to becoming a skilled Clojure developer ready to tackle contemporary software development challenges with creativity and assurance

**Clojure: High Performance JVM Programming** Eduardo Diaz, Shantanu Kumar, Akhil Wali, 2017-01-31 Explore the world of lightning fast Clojure apps with asynchronous channels logic reactive programming and more About This Book Discover Clojure's features and advantages and use them in your existing projects Explore lesser known and more advanced features constructs and methodologies such as asynchronous channels actors logic programming and reactive programming Measure and monitor performance and understand optimization techniques Who This Book Is For If you're looking to learn more about its core libraries and delve into the Clojure language in detail then this book is ideal for you Prior knowledge of the Clojure language is required What You Will Learn Understand tools for the Clojure world and how they relate to Java tools and standards such as Maven Write simple multicore programs using Clojure's core concepts such as atoms agents and refs Get to grips with Clojure's concurrency and state management primitives in depth Analyze latency using the Criterium library Avoid reflection and boxing with type hints Maximize the impact of parallelization functional composition and process transformation by composing reducers and transducers Modify and add features to the Clojure language using macros Test your code with unit tests specs and type checks to write testable code Troubleshoot and style your Clojure code to make it more maintainable In Detail Clojure is a general purpose language from the Lisp family with an emphasis on functional programming It has some interesting concepts and features such as immutability gradual typing thread safe concurrency primitives and macro based metaprogramming which makes it a great choice to create modern performant and scalable applications This learning path aims at unleashing the true potential of the Clojure language so you can use it in your projects It begins with installing and setting up the Clojure environment before moving on to explore the language in depth You'll get acquainted with its various features such as functional programming concurrency reducers transducers core async and core logic and so on with a great level of detail Moving on you'll also learn how to enhance performance using Java interoperability and JVM specific features from Clojure you'll even master language features such as asynchronous channels actors logic programming reactive programming metaprogramming and so on This learning path combines some of the best that Packt has to offer in one complete curated package It includes content from the following Packt products Clojure for Java Developers by Eduardo Diaz Clojure High Performance Programming Second Edition by Shantanu Kumar Mastering Clojure by Akhil Wali Style and approach This is an easy to follow step by step guide to start writing Clojure programs making use of all of its varied features and advantages

**Living Clojure** Carin Meier, 2015 If you're an experienced programmer who has not worked with Clojure before this guide is the perfect thorough but gentle introduction for you Author Carin Meier not only provides a practical overview of this JVM language and its functional programming concepts but also includes a complete hands on training course to help you learn Clojure in a structured way The first half of the book takes you through Clojure's unique design and lets you try your hand at two Clojure projects



including a web app The holistic course in second half provides you with critical tools and resources including ways to plug into the Clojure community Understand the basic structure of a Clojure expression Learn how to shape and control code in a functional way Discover how Clojure handles real world state and concurrency Take advantage of Java classes and learn how Clojure handles polymorphism Manage and use libraries in a Clojure project Use the core async library for asynchronous and concurrent communication Explore the power of macros in Clojure programming Learn how to think in Clojure by following the book u2019s seven week training course

**Clojure Concurrency** Milan Mulji,2016-11-30 Build high performance multithreaded applications using Clojure s powerful toolsAbout This Book Get to know the low and high level concepts of parallel programming and concurrency in detail Get the only book on the market focused on Clojure concurrency A comprehensive guide with step by step approach that will help you learn the mechanisms to build concurrent applicationsWho This Book Is ForThis book is for users who have a basic understanding of Clojure and wants to dive deep in the technology Prior knowledge of concurrent programming is not required If you have a solid understanding of the Java language you will also find this book helpful What You Will Learn Understand the JVM primitives upon which other abstractions are built Avoid the typical problems developers come across while writing concurrent applications Grasp the different approaches to write concurrent and parallel applications Build concurrent applications at scale using the Cloud and OSS Differentiate between application requirements and select appropriate implementation patterns Set up a basic project using Leiningen Write code that can protect against application errors using transactions Build a small fault tolerant application using the Actors concurrency mechanism Develop applications that utilise GPU computationIn DetailConcurrency programming helps developers capture the logical structure of certain applications and cope with independent physical devices thus ensuring multiple users work on a database without interference Clojure is a great language to build concurrent applications with Many applications require simultaneous task processing but Clojure uses a multi threaded approach to implement concurrent programming Through this book you will be able to understand the philosophy of Clojure and leverage the power of the multicore processor We will help you write your code more efficiently and make inherently more scalable You will learn to build and test robust programs that make full use of your hardware We will also take a look at writing concurrent applications at scale that run on the cloud with multiple servers

*Clojure: High Performance JVM Programming* Eduardo Diaz,Shantanu Kumar,Akhil Wali,2017-01-31 Explore the world of lightning fast Clojure apps with asynchronous channels logic reactive programming and more About This Book Discover Clojure s features and advantages and use them in your existing projects Explore lesser known and more advanced features constructs and methodologies such as asynchronous channels actors logic programming and reactive programming Measure and monitor performance and understand optimization techniques Who This Book Is For If you re looking to learn more about its core libraries and delve into the Clojure language in detail then this book is ideal for you Prior knowledge of the Clojure language is required What

You Will Learn Understand tools for the Clojure world and how they relate to Java tools and standards such as Maven Write simple multicore programs using Clojure s core concepts such as atoms agents and refs Get to grips with Clojure s concurrency and state management primitives in depth Analyze latency using the Criterium library Avoid reflection and boxing with type hints Maximize the impact of parallelization functional composition and process transformation by composing reducers and transducers Modify and add features to the Clojure language using macros Test your code with unit tests specs and type checks to write testable code Troubleshoot and style your Clojure code to make it more maintainable In Detail Clojure is a general purpose language from the Lisp family with an emphasis on functional programming It has some interesting concepts and features such as immutability gradual typing thread safe concurrency primitives and macro based metaprogramming which makes it a great choice to create modern performant and scalable applications This learning path aims at unleashing the true potential of the Clojure language so you can use it in your projects It begins with installing and setting up the Clojure environment before moving on to explore the language in depth You ll get acquainted with its various features such as functional programming concurrency reducers transducers core async and core logic and so on with a great level of detail Moving on you ll also learn how to enhance performance using Java interoperability and JVM specific features from Clojure you ll even master language features such as asynchronous channels actors logic programming reactive programming metaprogramming and so on This learning path combines some of the best that Packt has to offer in one complete curated package It includes content from the following Packt products Clojure for Java Developers by Eduardo Diaz Clojure High Performance Programming Second Edition by Shantanu Kumar Mastering Clojure by Akhil Wali Style and approach This is an easy to follow step by step guide to start writing Clojure programs making use of all of its varied features and advantages

*Cocos2d Game Development Blueprints* Jorge Jordan,2015-01-30 Whether you are a passionate gamer like developing or are just curious about game development this book is for you The book has been written to teach 2D game development to app developers and to teach Objective C to game developers as learning Cocos2d is the perfect step for both roles

*Mastering the Art of Clojure Programming: Unraveling the Secrets of Expert-Level Programming* Steve Jones,2025-02-15 Unlock the full potential of Clojure with Mastering the Art of Clojure Programming Unraveling the Secrets of Expert Level Programming This comprehensive guide is meticulously crafted for experienced programmers ready to elevate their understanding and proficiency in Clojure to new heights Delve into advanced topics from the intricacies of Clojure s syntax and semantics to the high level application of functional programming paradigms Each chapter is designed to provide profound insights enhanced by practical examples and real world applications offering a pathway to writing extensible efficient and maintainable code Explore a wide array of topics that define the modern Clojure developer s toolkit Engage with concepts such as multithreading and concurrency leveraging Software Transactional Memory STM and core async for responsive and robust applications Learn to employ design patterns and functional programming techniques

seamlessly within your projects ensuring that your applications are not only high performing but also scalable and intuitive From optimizing data structures and algorithms to creating sophisticated web applications and integrating with Java this book covers it all equipping you with the necessary expertise for building advanced software solutions Mastering the Art of Clojure Programming stands as an indispensable resource that balances theoretical understanding with practical execution By elucidating complex ideas in a clear and concise manner it prepares you to tackle the challenges of modern software development head on Whether you aim to refine your current skills or explore new dimensions of Clojure programming this book is your gateway to mastering the art of creating innovative and powerful applications with Clojure Living Clojure Carin Meier,2015-04-14 Annotation If you re an experienced programmer looking for a thorough but gentle introduction to Clojure this is the perfect guide for you Author Carin Meier not only provides a practical overview of this JVM language and its functional programming concepts but also includes a complete hands on training course to help you learn Clojure in a structured way **The The Clojure Workshop** Joseph Fahey,Thomas Haratyk,Scott McCaughie,Yehonathan Sharvit,Konrad Szydlo,2020-01-29 Learn how to solve problems using Clojure or ClojureScript and become a confident functional programmer with the help of engaging activities and challenging projects Key FeaturesMaster the tools and patterns of the Clojure and ClojureScript ecosystemsLearn the fundamentals of functional programming and immutabilityApply your skills practically by developing a range of scalable applicationsBook Description The Clojure Workshop is a step by step guide to Clojure and ClojureScript designed to quickly get you up and running as a confident knowledgeable developer Because of the functional nature of the language Clojure programming is quite different to what many developers will have experienced As hosted languages Clojure and ClojureScript can also be daunting for newcomers because of complexities in the tooling and the challenge of interacting with the host platforms To help you overcome these barriers this book adopts a practical approach Every chapter is centered around building something As you progress through the book you will progressively develop the muscle memory that will make you a productive Clojure programmer and help you see the world through the concepts of functional programming You will also gain familiarity with common idioms and patterns as well as exposure to some of the most widely used libraries Unlike many Clojure books this Workshop will include significant coverage of both Clojure and ClojureScript This makes it useful no matter your goal or preferred platform and provides a fresh perspective on the hosted nature of the language By the end of this book you ll have the knowledge skills and confidence to creatively tackle your own ambitious projects with Clojure and ClojureScript What you will learnWrite idiomatic code with Clojure and ClojureScriptUnderstand and use common patterns and best practicesExperiment with code and interact with programs using the REPLLearn the fundamentals of functional programming and immutabilityMaster concepts including mapping filtering reducing and recursionStructure and build your code using namespaces and LeiningenWrite unit tests to validate application behaviorSimplify your code and improve efficiency with macrosWho this

book is for The Clojure Workshop is for anyone who is curious about functional programming and wants to get started learning Clojure or ClojureScript Prior experience of another programming language such as Java or JavaScript is recommended and will help you grasp the concepts covered in this book more easily *Clojure in Action* Amit Rathore, 2015-12-16 Summary A fully revised edition that covers the new features available in Clojure 1.6 Purchase of the print book includes a free eBook in PDF Kindle and ePub formats from Manning Publications About the Technology Clojure is a modern Lisp for the JVM It has the strengths you expect first class functions macros and Lisp's clean programming style It supports functional programming making it ideal for concurrent programming and for creating domain specific languages Clojure lets you solve harder problems make faster changes and end up with a smaller code base It's no wonder that there are so many Clojure success stories About the Book Clojure in Action Second Edition is an expanded and improved version that's been updated to cover the new features of Clojure 1.6 The book gives you a rapid introduction to the Clojure language moving from abstract theory to practical examples You'll start by learning how to use Clojure as a general purpose language Next you'll explore Clojure's efficient concurrency model based on the database concept of Software Transactional Memory STM You'll gain a new level of productivity through Clojure DSLs that can run on the JVM Along the way you'll learn countless tips tricks and techniques for writing smaller safer and faster code What's Inside Functional programming basics Metaprogramming with Clojure's macros Interoperating with Java Covers Clojure 1.6 About the Reader Assumes readers are familiar with a programming language like C Java Ruby or Python Table of Contents Introducing Clojure Clojure elements Data structures and functions Building blocks of Clojure Multimethod polymorphism Exploring Clojure and Java interop State and the concurrent world Evolving Clojure through macros More on functional programming Protocols records and types Test driven development and more More macros and DSL

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## **Clojure Reactive Programming How To Develop Concurrent And Asynchronous Applications With Clojure Introduction**

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