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Clojure High Performance Programming

Second Edition

Become an expert at writing fast and high performant code in Clojure 1.7.0

Shantanu Kumar

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Clojure High Performance Programming Kumar Shantanu

**Alex Miller, Stuart Halloway, Aaron
Bedra**



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Clojure High Performance Programming Shantanu Kumar, 2013-11 This is a short practical guide that will teach you everything you need to know to start writing high performance Clojure code This book is ideal for intermediate Clojure developers who are looking to get a good grip on how to achieve optimum performance You should already have some experience with Clojure and it would help if you already know a little bit of Java Knowledge of performance analysis and engineering is not required For hands on practice you should have access to Clojure REPL with Leiningen [Clojure High Performance Programming - Second Edition](#) Shantanu Kumar, 2015-09-29 Become an expert at writing fast and high performant code in Clojure 1 7 0 About This Book Enhance code performance by using appropriate Clojure features Improve the efficiency of applications and plan their deployment A hands on guide to designing Clojure programs to get the best performance Who This Book Is For This book is intended for intermediate Clojure developers who are looking to get a good grip on achieving optimum performance Having a basic knowledge of Java would be helpful What You Will Learn Identify performance issues in Clojure programs using different profiling tools Master techniques to achieve numerical performance in Clojure Use Criterium library to measure latency of Clojure expressions Exploit Java features in Clojure code to enhance performance Avoid reflection and boxing with type hints Understand Clojure's concurrency and state management primitives in depth Measure and monitor performance and understand optimization techniques In Detail Clojure treats code as data and has a macro system It focuses on programming with immutable values and explicit progression of time constructs which are intended to facilitate the development of more robust programs particularly multithreaded ones It is built with performance pragmatism and simplicity in mind Like most general purpose languages various Clojure features have different performance characteristics that one should know in order to write high performance code This book shows you how to evaluate the performance implications of various Clojure abstractions discover their underpinnings and apply the right approach for optimum performance in real world programs It starts by helping you classify various use cases and the need for them with respect to performance and analysis of various performance aspects You will also learn the performance vocabulary that experts use throughout the world and discover various Clojure data structures abstractions and their performance characteristics Further the book will guide you through enhancing performance by using Java interoperability and JVM specific features from Clojure It also highlights the importance of using the right concurrent data structure and Java concurrency abstractions This book also sheds light on performance metrics for measuring how to measure and how to visualize and monitor the collected data At the end of the book you will learn to run a performance profiler identify bottlenecks tune performance and refactor code to get a better performance Style and approach An easy to follow guide full of real world examples and self sufficient code snippets that will help you get your hands dirty with high performance programming with Clojure *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

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 moreAbout 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 techniquesWho This Book Is ForIf 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

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Clojure High Performance Programming Shantanu Kumar, 2013 This is a short practical guide that will teach you everything you need to know to start writing high performance Clojure code This book is ideal for intermediate Clojure developers who are looking to get a good grip on how to achieve optimum performance You should already have some experience with Clojure and it would help if you already know a little bit of Java Knowledge of performance analysis and engineering is not required For hands on practice you should have access to Clojure REPL with Leiningen

Clojure Web Development Essentials Ryan Baldwin, 2015-02-24 This book is for anyone who's worked with Clojure and wants to use it to start developing applications for the Web Experience or familiarity with basic Clojure syntax is a must and exposure to Leiningen or other similar build tools such as Maven would be helpful

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 Macros Colin Jones, 2014-08-26 Level up your skills by taking advantage of Clojure's powerful macro system Macros make hard things

possible and normal things easy They can be tricky to use and this book will help you deftly navigate the terrain You ll discover how to write straightforward code that avoids duplication and clarifies your intentions You ll learn how and why to write macros You ll learn to recognize situations when using a macro would and wouldn t be helpful And you ll use macros to remove unnecessary code and build new language features Clojure offers some sharp tools in its toolbox and one of the sharpest is its macro system This book will help you write macros using Clojure and more importantly recognize when you should be using macros in the first place The Lisp code as data philosophy gives tremendous advantages to macro authors and users You can use macros to evaluate code in other contexts move computations to compile time and create beautiful API layers You don t need to wait on the Clojure language itself to add new features you ll learn how to implement even the lowest level features as macros You ll step through representative samples of how to use macros in production libraries and applications find clear details on how to construct macros and learn pointers to avoid obstacles that often trip up macro amateurs Clojure macros are more straightforward to use than metaprogramming features in many other languages but they re different enough from normal programming to present challenges of their own Mastering Clojure Macros examines some of these issues along with alternatives to macros where they exist By the time you finish this book you ll be thinking like a macro professional What You Need The book examples have been developed under Clojure 1 6 0 although earlier and later versions of Clojure may work as well You ll want to use Leiningen 2 x in order to follow along with the examples that use external projects

Clojure for Data Science Henry Garner, 2015-09-03 Statistics big data and machine learning for Clojure programmers About This Book Write code using Clojure to harness the power of your data Discover the libraries and frameworks that will help you succeed A practical guide to understanding how the Clojure programming language can be used to derive insights from data Who This Book Is For This book is aimed at developers who are already productive in Clojure but who are overwhelmed by the breadth and depth of understanding required to be effective in the field of data science Whether you re tasked with delivering a specific analytics project or simply suspect that you could be deriving more value from your data this book will inspire you with the opportunities and inform you of the risks that exist in data of all shapes and sizes What You Will Learn Perform hypothesis testing and understand feature selection and statistical significance to interpret your results with confidence Implement the core machine learning techniques of regression classification clustering and recommendation Understand the importance of the value of simple statistics and distributions in exploratory data analysis Scale algorithms to web sized datasets efficiently using distributed programming models on Hadoop and Spark Apply suitable analytic approaches for text graph and time series data Interpret the terminology that you will encounter in technical papers Import libraries from other JVM languages such as Java and Scala Communicate your findings clearly and convincingly to nontechnical colleagues In Detail The term data science has been widely used to define this new profession that is expected to interpret vast datasets and translate them to improved decision making and

performance Clojure is a powerful language that combines the interactivity of a scripting language with the speed of a compiled language Together with its rich ecosystem of native libraries and an extremely simple and consistent functional approach to data manipulation which maps closely to mathematical formula it is an ideal practical and flexible language to meet a data scientist s diverse needs Taking you on a journey from simple summary statistics to sophisticated machine learning algorithms this book shows how the Clojure programming language can be used to derive insights from data Data scientists often forge a novel path and you ll see how to make use of Clojure s Java interoperability capabilities to access libraries such as Mahout and Mllib for which Clojure wrappers don t yet exist Even seasoned Clojure developers will develop a deeper appreciation for their language s flexibility You ll learn how to apply statistical thinking to your own data and use Clojure to explore analyze and visualize it in a technically and statistically robust way You can also use Incanter for local data processing and ClojureScript to present interactive visualisations and understand how distributed platforms such as Hadoop sand Spark s MapReduce and GraphX s BSP solve the challenges of data analysis at scale and how to explain algorithms using those programming models Above all by following the explanations in this book you ll learn not just how to be effective using the current state of the art methods in data science but why such methods work so that you can continue to be productive as the field evolves into the future Style and approach This is a practical guide to data science that teaches theory by example through the libraries and frameworks accessible from the Clojure programming language *Clojure Data Structures and Algorithms Cookbook* Rafik Naccache,2015-08-19 25 recipes to deeply understand and implement advanced algorithms in Clojure About This Book Explore various advanced algorithms and learn how they are used to address many real world computing challenges Construct elegant solutions using impressive techniques including zippers parsing and pattern matching Solve complex problems by adopting innovative approaches such as logic or asynchronous programming In Detail Data structures and algorithms often cross your path when you compress files compile programs access databases or simply use your favourite text editor Understanding and implementing them can be daunting Curious learners and industrial developers can find these complex especially if they focus on the detailed implementation of these data structures Clojure is a highly pragmatic and expressive language with efficient and easy data manipulation capabilities As such it is great for implementing these algorithms By abstracting away a great share of the unnecessary complexity resulting from implementation Clojure and its contrib libraries will help you address various algorithmic challenges making your data exploration both profitable and enjoyable Through 25 recipes you ll explore advanced algorithms and data structures well served by a sound Clojure implementation This book opens with an exploration of alternative uses of the array data structure covering LZ77 compression drawing fractals using Pascal s triangles simulating a multi threaded program execution and implementing a call stack winding and un winding operations The book elaborates on linked lists showing you how to construct doubly linked ones speed up search times over the elements of such structures use a linked list as the foundation of

a shift reduce parser and implement an immutable linked list using skew binary numbers representation After that the tree data structure is explored focusing on building self balancing Splay Trees designing a B Tree backing up an efficient key value data store constructing an undo capable Rope and showing how Tries can make for an auto completing facility Next some optimization and machine learning techniques are discussed namely for building a co occurrence based recommendation engine using branch and bound to optimize integral cost and profit problems using Dijkstra s algorithm to determine optimal paths and summarizing texts using the LexRank algorithm Particular attention is given to logic programming you will learn to use this to discover interesting relations between social website data by designing a simple type inferencer for a mini Java like language and by building a simple checkers game engine Asynchronous programming will be addressed and you will design a concurrent web crawler an interactive HTML5 game and an online taxi booking platform Finally you ll explore advanced cases for higher order functions in Clojure while implementing a recursive descent parser using efficient mutual recursion devising a mini reusable firewall simulator thanks to Clojure 1 7 new transducers feature or building a simple unification engine with the help of Continuation Passing Style What You Will Learn Explore alternative uses of classical data structures like arrays and linked lists Discover advanced types of tree data structures Explore advanced machine learning and optimization techniques Utilise powerful Clojure libraries such as Instaparse for parsing core match for pattern matching clojure zip for zippers and clojure matrix for matrix operations Learn logic programming through the usage of the library core logic Master asynchronous programming using the core async library See the transducers in action while resolving real world use cases Who This Book Is For If you are an experienced Clojure developer longing to take your knowledge to the next level by discovering and using advanced algorithms and seeing how they can be applied to real world problems then this book is for you Style and approach This book consists of a set of step by step recipes each demonstrating the material covered in action so it is put in context When necessary pointers to further resources are provided

[Clojure Data Analysis Cookbook - Second Edition](#) Eric Rochester,2015-01-27 This book is for those with a basic knowledge of Clojure who are looking to push the language to excel with data analysis

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 run 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 andbe 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 reuse their web skills in a different language

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

The Joy of Clojure Chris Houser, Michael Fogus, 2014-05-28 Summary The Joy of Clojure Second Edition is a deep look at the Clojure language Fully updated for Clojure 1.6 this new edition goes beyond just syntax to show you the why of Clojure and how to write fluent Clojure code You ll learn functional and declarative approaches to programming and will master the techniques that make Clojure so elegant and efficient Purchase of the print book includes a free eBook in PDF Kindle and ePub formats from Manning Publications About the Technology The Clojure programming language is a dialect of Lisp that runs on the Java Virtual Machine and JavaScript runtimes It is a functional programming language that offers great performance expressive power and stability by design It gives you built in concurrency and the predictable precision of immutable and persistent data structures And it s really really fast The instant you see long blocks of Java or Ruby dissolve into a few lines of Clojure you ll know why the authors of this book call it a joyful language It s no wonder that enterprises like Staples are betting their infrastructure on Clojure About the Book The Joy of Clojure Second Edition is a deep account of the Clojure language Fully updated for Clojure 1.6 this new edition goes beyond the syntax to show you how to write fluent Clojure code You ll learn functional and declarative approaches to programming and will master techniques that make Clojure elegant and efficient The book shows you how to solve hard problems related to concurrency interoperability and performance and how

great it can be to think in the Clojure way Appropriate for readers with some experience using Clojure or common Lisp What
s Inside Build web apps using ClojureScript Master functional programming techniques Simplify concurrency Covers Clojure
1 6 About the Authors Michael Fogus and Chris Houser are contributors to the Clojure and ClojureScript programming
languages and the authors of various Clojure libraries and language features Table of Contents PART 1 FOUNDATIONS
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Java next Why ClojureScript PART 6 TANGENTIAL CONSIDERATIONS Data oriented programming Performance Thinking
programs Clojure changes the way you think Mastering Clojure Data Analysis Eric Rochester,2014-05-26 This book
consists of a practical exampleoriented approach that aims to help you learn how to use Clojure for data analysis quickly and
efficiently This book is great for those who have experience with Clojure and need to use it to perform data analysis This
book will also be hugely beneficial for readers with basic experience in data analysis and statistics **Professional Clojure**
Jeremy Anderson,Michael Gaare,Justin Holguín,Nick Bailey,Timothy Pratley,2016-05-25 Clear practical Clojure for the
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print workflow that enables fast feedback loops then dives into enterprise level Clojure development with expert guidance on
web services testing datomics performance and more Read from beginning to end this book serves as a clear direct guide to
Clojure programming but the comprehensive coverage and detail makes it extraordinarily useful as a quick reference for mid
project snags The author team includes four professional Clojure developers ensuring professional level instruction from a
highly practical perspective Clojure is an open source programming language maintained and supported by Cognitect and
quickly gaining use across industries at companies like Amazon Walmart Facebook Netflix and more This guide provides a
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pages using ClojureScript Adopt an REPL driven development workflow Clojure is a modern dialect of Lisp designed for
concurrency and Java compatibility It can be used with the Java virtual machine Microsoft s Common Language Runtime and
JavaScript engines providing a level of both versatility and functionality that is appealing to more and more enterprise level
developers As requirements grow increasingly complex stepping away from imperative programming can dramatically
streamline the development workflow Professional Clojure provides the expert instruction that gets professionals up to speed
and back to work quickly *Clojure Programming* Chas Emerick,Brian Carper,Christophe Grand,2012-04-12 The Clojure

language offers a practical alternative for solving demanding problems using existing Java libraries frameworks and services Readers get a solid grounding in Clojure fundamentals based on the environments they are already familiar with whether working with data concurrency application interfaces or other challenges

Programming Clojure Alex Miller, Stuart Halloway, Aaron Bedra, 2018-02-23 Drowning in unnecessary complexity unmanaged state and tangles of spaghetti code In the best tradition of Lisp Clojure gets out of your way so you can focus on expressing simple solutions to hard problems Clojure cuts through complexity by providing a set of composable tools immutable data functions macros and the interactive REPL Written by members of the Clojure core team this book is the essential definitive guide to Clojure This new edition includes information on all the newest features of Clojure such as transducers and specs Clojure joins the flexibility and agility of Lisp with the reach stability and performance of Java Combine Clojure s tools for maximum effectiveness as you work with immutable data functional programming and safe concurrency to write programs that solve real world problems Start by reading and understanding Clojure syntax and see how Clojure is evaluated From there find out about the sequence abstraction which combines immutable collections with functional programming to create truly reusable data transformation code Clojure is a functional language learn how to write programs in a functional style and when and how to use recursion to your advantage Discover Clojure s unique approach to state and identity techniques for polymorphism and open systems using multimethods and protocols and how to leverage Clojure s metaprogramming capabilities via macros Finally put all the pieces together in a real program New to this edition is coverage of Clojure s spec library one of the most interesting new features of Clojure for describing both data and functions You can use Clojure spec to validate data destructure data explain invalid data and generate large numbers of tests to verify the correctness of your code With this book you ll learn how to think in Clojure and how to take advantage of its combined strengths to build powerful programs quickly What You Need Java 6 or higher Clojure 1 9

[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 [The Joy of Clojure](#) Michael Fogus,Chris Houser,2011-04-07 About the Book If you've seen how dozens of lines of Java or Ruby can dissolve into just a few lines of Clojure you'll know why the authors of this book call it a joyful language Clojure is a dialect of Lisp that runs on the JVM It combines the nice features of a scripting language with the powerful features of a production environment features like persistent data structures and clean multithreading that you'll need for industrial strength application development The Joy of Clojure goes beyond just syntax to show you how to write fluent and idiomatic Clojure code You'll learn a functional approach to programming and will master Lisp techniques that make Clojure so elegant and efficient The book gives you easy access to hard software areas like concurrency interoperability and performance And it shows you how great it can be to think about problems the Clojure way Purchase of the print book comes with an offer of a free PDF ePub and Kindle eBook from Manning Also available is all code from the book What's Inside The what and why of Clojure How to work with macros How to do elegant application design Functional programming idioms Written for programmers coming to Clojure from another programming background no prior experience with Clojure or Lisp is required

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Clojure High Performance Programming Kumar Shantanu Introduction

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