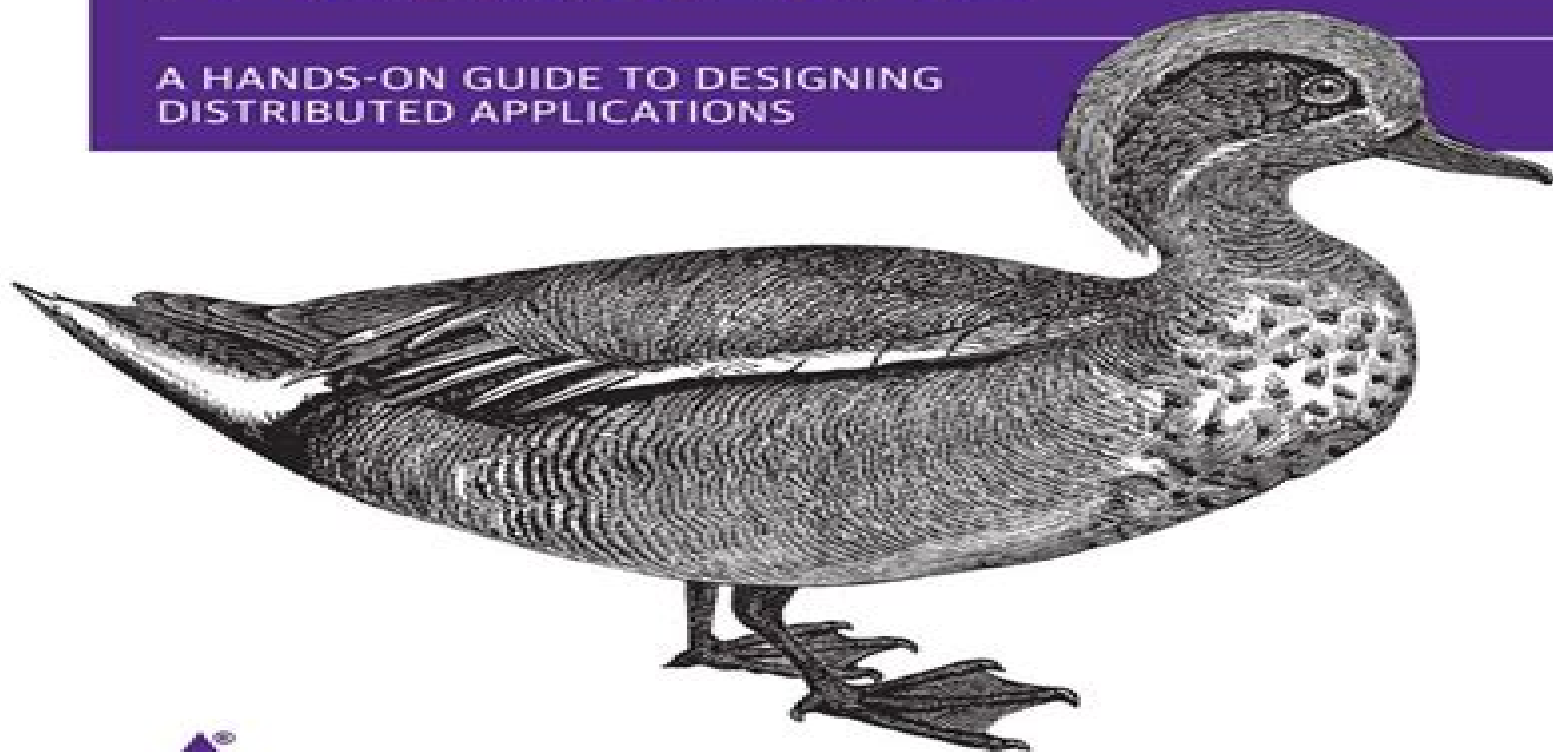# Applied Akka Patterns

A HANDS-ON GUIDE TO DESIGNING DISTRIBUTED APPLICATIONS

SPD

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Prasanna Kumar Sathyanarayanan,Suraj Atreya

Applied Akka Patterns A Hands On Guide To Designing Distributed Applications:

Applied Akka Patterns Michael Nash,Wade Waldron,2016-12-12 When it comes to big data processing we can no longer ignore concurrency or try to add it in after the fact Fortunately the solution is not a new paradigm of development but rather an old one With this hands on guide Java and Scala developers will learn how to embrace concurrent and distributed applications with the open source Akka toolkit You ll learn how to put the actor model and its associated patterns to immediate and practical use Throughout the book you ll deal with an analogous workforce problem how to schedule a group of people across a variety of projects while optimizing their time and skillsets This example will help you understand how Akka uses actors streams and other tools to stitch your application together Model software that reflects the real world with domain driven design Learn principles and practices for implementing individual actors Unlock the real potential of Akka with patterns for combining multiple actors Understand the consistency tradeoffs in a distributed system Use several Akka methods for isolating and dealing with failures Explore ways to build systems that support availability and scalability Tune your Akka application for performance with JVM tools and dispatchers   **Applied Akka Patterns** Michael Nash. Wade Waldron,2016   **Applied Akka Patterns** Michael Nash,Wade Waldron,2016-12-12 When it comes to big data processing we can no longer ignore concurrency or try to add it in after the fact Fortunately the solution is not a new paradigm of development but rather an old one With this hands on guide Java and Scala developers will learn how to embrace concurrent and distributed applications with the open source Akka toolkit You ll learn how to put the actor model and its associated patterns to immediate and practical use Throughout the book you ll deal with an analogous workforce problem how to schedule a group of people across a variety of projects while optimizing their time and skillsets This example will help you understand how Akka uses actors streams and other tools to stitch your application together Model software that reflects the real world with domain driven design Learn principles and practices for implementing individual actors Unlock the real potential of Akka with patterns for combining multiple actors Understand the consistency tradeoffs in a distributed system Use several Akka methods for isolating and dealing with failures Explore ways to build systems that support availability and scalability Tune your Akka application for performance with JVM tools and dispatchers   *Designing Distributed Systems* Brendan Burns,2018   *Reactive Programming with Scala and Akka* Prasanna Kumar Sathyanarayanan,Suraj Atreya,2016-02-29 Harness reactive programming to build scalable and fault tolerant distributed systems using Scala and AkkaAbout This Book Use the concepts of reactive programming to build distributed systems running on multiple nodes Get to grips with the full range of Akka features including the upcoming and cutting edge experimental modules A comprehensive coverage of the principles of FRP with real world use cases to solve scalability issues Who This Book Is ForIf you are a developer who is passionate about building fault tolerant scalable distributed applications using Scala and Akka then this book will give you a jump start You should be familiar with Scala but no prior knowledge of Akka and reactive programming

is required What You Will Learn Explore functional programming using Scala Design an asynchronous non blocking shopping cart application using Futures Understand the Akka actor model and the relationship between actors and threads Use the Actor Supervision feature to build a fault tolerant and resilient application Create your own distributed system framework using an Akka cluster Take a look under the hood to gain perspective on the Akka engine See a comprehensive case study of a key value store with concurrent reads and writes Model a finite state machine using state driven actorsIn DetailToday s web based applications need to scale quickly to tackle the demands of modern users Reactive programming is the solution developed to ensure the fault tolerant and robust scaling that is essential for professional applications Reactive programming in Scala and Akka provides a great platform to develop low latency resilient concurrent Internet scale applications on the Java Virtual Machine This comprehensive guide will help you get to grips with the concepts of reactive programming in order to build a robust distributed system in Scala and Akka Written in two parts you will first take a walkthrough of the reactive asynchronous and functional concepts in Scala before focusing on Akka and getting to grips with the details of real world use cases Begin with an introduction into functional reactive programming before moving on to writing asynchronous application with non blocking constructs in Scala Get familiar with the concept of actor based concurrency using Akka and features such as Akka remoting routing and persistence capabilities to build distributed applications Learn to scale applications using a multi node Akka cluster and unit test Akka actors and get to grips with state machines and how to implement state driven actors using Akka Finally put your skills to the test with a case study where you will concurrently and asynchronously store and retrieve data from a key value store By progressively working through the Akka concepts you will not only be able to write your own distributed system but also appreciate the hidden complexity within the Akka ecosystem Style and approachThis comprehensive guide walks you through the basics of reactive programming in Scala and Akka explaining some of the most frequently used constructs to the most advanced features and taking you through building a full blown distributed system with the help of real world examples   **Reactive Design Patterns** Jamie Allen,2017-02-21 Summary Reactive Design Patterns is a clearly written guide for building message driven distributed systems that are resilient responsive and elastic In this book you ll find patterns for messaging flow control resource management and concurrency along with practical issues like test friendly designs All patterns include concrete examples using Scala and Akka Foreword by Jonas Bon r Purchase of the print book includes a free eBook in PDF Kindle and ePub formats from Manning Publications About the Technology Modern web applications serve potentially vast numbers of users and they need to keep working as servers fail and new ones come online users overwhelm limited resources and information is distributed globally A Reactive application adjusts to partial failures and varying loads remaining responsive in an ever changing distributed environment The secret is message driven architecture and design patterns to organize it About the Book Reactive Design Patterns presents the principles patterns and best practices of Reactive application design You ll learn how to keep one slow

component from bogging down others with the Circuit Breaker pattern how to shepherd a many staged transaction to completion with the Saga pattern how to divide datasets by Sharding and more You ll even see how to keep your source code readable and the system testable despite many potential interactions and points of failure What s Inside The definitive guide to the Reactive Manifesto Patterns for flow control delimited consistency fault tolerance and much more Hard won lessons about what doesn t work Architectures that scale under tremendous load About the Reader Most examples use Scala Java and Akka Readers should be familiar with distributed systems About the Author Dr Roland Kuhn led the Akka team at Lightbend and coauthored the Reactive Manifesto Brian Hanafee and Jamie Allen are experienced distributed systems architects Table of Contents PART 1 INTRODUCTION Why Reactive A walk through of the Reactive Manifesto Tools of the trade PART 2 THE PHILOSOPHY IN A NUTSHELL Message passing Location transparency Divide and conquer Principled failure handling Delimited consistency Nondeterminism by need Message flow PART 3 PATTERNS Testing reactive applications Fault tolerance and recovery patterns Replication patterns Resource management patterns Message flow patterns Flow control patterns State management and persistence patterns   Learning Akka Jason Goodwin,2015 Build fault tolerant concurrent and distributed applications with AkkaAbout This Book Build networked applications that self heal Scale out your applications to handle more traffic faster An easy to follow guide with a number of examples to ensure you get the best start with AkkaWho This Book Is ForThis book is intended for beginner to intermediate Java or Scala developers who want to build applications to serve the high scale user demands in computing today If you need your applications to handle the ever growing user bases and datasets with high performance demands then this book is for you Learning Akka will let you do more for your users with less code and less complexity by building and scaling your networked applications with ease What You Will Learn Use Akka to overcome the challenges of concurrent programming Resolve the issues faced in distributed computing with the help of Akka Scale applications to serve a high number of concurrent users Make your system fault tolerant with self healing applications Provide a timely response to users with easy concurrency Reduce hardware costs by building more efficient multi user applications Maximise network efficiency by scaling itIn DetailSoftware today has to work with more data more users more cores and more servers than ever Akka is a distributed computing toolkit that enables developers to build correct concurrent and distributed applications using Java and Scala with ease applications that scale across servers and respond to failure by self healing As well as simplifying development Akka enables multiple concurrency development patterns with particular support and architecture derived from Erlang s concept of actors lightweight concurrent entities Akka is written in Scala which has become the programming language of choice for development on the Akka platform Learning Akka aims to be a comprehensive walkthrough of Akka This book will take you on a journey through all the concepts of Akka that you need in order to get started with concurrent and distributed applications and even build your own Beginning with the concept of Actors the book will take you through concurrency in Akka Moving on to networked

applications this book will explain the common pitfalls in these difficult problem areas while teaching you how to use Akka to overcome these problems with ease The book is an easy to follow example based guide that will strengthen your basic knowledge of Akka and aid you in applying the same to real world scenarios Style and approachAn easy to follow example based guide that will take you through building several networked applications that work together while you are learning concurrent and distributed computing concepts Each topic is explained while showing you how to design with Akka and how it is used to overcome common problems in applications By showing Akka in context to the problems it will help you understand what the common problems are in distributed applications and how to overcome them   Designing Distributed Systems Brendan Burns,2024-12-04 Every distributed system strives for reliability performance and quality but building such a system is hard Establishing a set of design patterns enables software developers and system architects to use a common language to describe their systems and learn from the patterns and practices developed by others The popularity of containers and Kubernetes paves the way for core distributed system patterns and reusable containerized components This practical guide presents a collection of repeatable generic patterns to help guide the systems you build using common patterns and practices drawn from some of the highest performing distributed systems in use today These common patterns make the systems you build far more approachable and efficient even if you ve never built a distributed system before Author Brendan Burns demonstrates how you can adapt existing software design patterns for designing and building reliable distributed applications Systems engineers and application developers will learn how these long established patterns provide a common language and framework for dramatically increasing the quality of your system This fully updated second edition includes new chapters on AI inference AI training and building robust systems for the real world Understand how patterns and reusable components enable the rapid development of reliable distributed systems Use the sidecar adapter and ambassador patterns to split your application into a group of containers on a single machine Explore loosely coupled multinode distributed patterns for replication scaling and communication between components Learn distributed system patterns for large scale batch data processing covering work queues event based processing and coordinated workflows

Architecting Distributed Applications with Macrometa William Smith,2025-07-12 Architecting Distributed Applications with Macrometa In the rapidly evolving landscape of distributed systems Architecting Distributed Applications with Macrometa serves as a comprehensive and authoritative guide for architects engineers and technology leaders looking to harness the full potential of global data networks The book opens with foundational principles of distributed computing covering essential theories such as the CAP theorem and consensus algorithms and delves into practical concerns like failure handling data consistency and system security Through clear explanations and deep technical insight readers are equipped with the knowledge needed to design robust secure and scalable distributed architectures Moving beyond theory this book offers an in depth exploration of the Macrometa Global Data Network GDN Readers will gain an insider s perspective on its

innovative platform architecture data distribution mechanisms and advanced data models including streams collections and graphs Emphasis is placed on geo replication operational reliability and achieving compliance with international regulations all illustrated with real world patterns for data modeling partitioning and query performance Architectural challenges such as event driven design real time processing and edge computing are addressed with practical examples and design patterns tailored for modern cloud and hybrid environments Completing the journey the book features a series of hands on use cases and case studies from global e commerce and IoT telemetry to AI enabled applications and migration of legacy systems Detailed chapters on DevOps security and automation provide actionable guidance for achieving high availability disaster recovery and observability at global scale Finally it looks ahead to emerging trends in distributed data platforms privacy AI integration edge to cloud continuums and the transformative impact of quantum computing making it an essential reference for building the next generation of distributed applications   Reactive Messaging Patterns with the Actor Model Vaughn Vernon,2015-07-13 USE THE ACTOR MODEL TO BUILD SIMPLER SYSTEMS WITH BETTER PERFORMANCE AND SCALABILITY Enterprise software development has been much more difficult and failure prone than it needs to be Now veteran software engineer and author Vaughn Vernon offers an easier and more rewarding method to succeeding with Actor model Reactive Messaging Patterns with the Actor Model shows how the reactive enterprise approach Actor model Scala and Akka can help you overcome previous limits of performance and scalability and skillfully address even the most challenging non functional requirements Reflecting his own cutting edge work Vernon shows architects and developers how to translate the longtime promises of Actor model into practical reality First he introduces the tenets of reactive software and shows how the message driven Actor model addresses all of them making it possible to build systems that are more responsive resilient and elastic Next he presents a practical Scala bootstrap tutorial a thorough introduction to Akka and Akka Cluster and a full chapter on maximizing performance and scalability with Scala and Akka Building on this foundation you ll learn to apply enterprise application and integration patterns to establish message channels and endpoints efficiently construct route and transform messages and build robust systems that are simpler and far more successful Coverage Includes How reactive architecture replaces complexity with simplicity throughout the core middle and edges The characteristics of actors and actor systems and how Akka makes them more powerful Building systems that perform at scale on one or many computing nodes Establishing channel mechanisms and choosing appropriate channels for each application and integration challenge Constructing messages to clearly convey a sender s intent in communicating with a receiver Implementing a Process Manager for your Domain Driven Designs Decoupling a message s source and destination and integrating appropriate business logic into its router Understanding the transformations a message may experience in applications and integrations Implementing persistent actors using Event Sourcing and reactive views using CQRS Find unique online training on Domain Driven Design Scala Akka and other software craftsmanship topics using the for comprehension website at forcomprehension

com *Designing Distributed Systems* Brendan Burns,2024-12-04 Every distributed system strives for reliability performance and quality but building such a system is hard Establishing a set of design patterns enables software developers and system architects to use a common language to describe their systems and learn from the patterns and practices developed by others The popularity of containers and Kubernetes paves the way for core distributed system patterns and reusable containerized components This practical guide presents a collection of repeatable generic patterns to help guide the systems you build using common patterns and practices drawn from some of the highest performing distributed systems in use today These common patterns make the systems you build far more approachable and efficient even if you ve never built a distributed system before Author Brendan Burns demonstrates how you can adapt existing software design patterns for designing and building reliable distributed applications Systems engineers and application developers will learn how these long established patterns provide a common language and framework for dramatically increasing the quality of your system This fully updated second edition includes new chapters on AI inference AI training and building robust systems for the real world Understand how patterns and reusable components enable the rapid development of reliable distributed systems Use the sidecar adapter and ambassador patterns to split your application into a group of containers on a single machine Explore loosely coupled multinode distributed patterns for replication scaling and communication between components Learn distributed system patterns for large scale batch data processing covering work queues event based processing and coordinated workflows **Effective Akka** Jamie Allen,2013-08-15 Avoid common mistakes when building distributed asynchronous high performance software with the Akka toolkit and runtime With this concise guide author Jamie Allen provides a collection of best practices based on several years of using the actor model The book also includes examples of actor application types and two primary patterns of actor usage the Extra Pattern and Cameo Pattern Allen the Director of Consulting for Typesafe creator of Akka and the Scala programming language examines actors with a banking service use case throughout the book using examples shown in Akka and Scala If you have any experience with Akka this guide is essential Delve into domain driven and work distribution actor applications Understand why it s important to have actors do only one job Avoid thread blocking by allowing logic to be delegated to a Future Model interactions as simply as possible to avoid premature optimization Create well defined interactions and know exactly what failures can occur Learn why you should never treat actors as you would an ordinary class Keep track of what goes on in production by monitoring everything Tune Akka applications with the Typesafe Console *Cloud Native Patterns* Cornelia Davis,2019-05-31 Summary Cloud Native Patternsis your guide to developing strong applications that thrive in the dynamic distributed virtual world of the cloud This book presents a mental model for cloud native applications along with the patterns practices and tooling that set them apart Purchase of the print book includes a free eBook in PDF Kindle and ePub formats from Manning Publications About the Technology Cloud platforms promise the holy grail near zero downtime infinite scalability short feedback cycles

fault tolerance and cost control But how do you get there By applying cloudnative designs developers can build resilient easily adaptable web scale distributed applications that handle massive user traffic and data loads Learn these fundamental patterns and practices and you ll be ready to thrive in the dynamic distributed virtual world of the cloud About the Book With 25 years of experience under her belt Cornelia Davis teaches you the practices and patterns that set cloud native applications apart With realistic examples and expert advice for working with apps data services routing and more she shows you how to design and build software that functions beautifully on modern cloud platforms As you read you will start to appreciate that cloud native computing is more about the how and why rather than the where What s inside The lifecycle of cloud native apps Cloud scale configuration management Zero downtime upgrades versioned services and parallel deploys Service discovery and dynamic routing Managing interactions between services including retries and circuit breakers About the Reader Requires basic software design skills and an ability to read Java or a similar language About the Author Cornelia Davis is Vice President of Technology at Pivotal Software A teacher at heart she s spent the last 25 years making good software and great software developers Table of Contents PART 1 THE CLOUD NATIVE CONTEXT You keep using that word Defining cloud native Running cloud native applications in production The platform for cloud native software PART 2 CLOUD NATIVE PATTERNS Event driven microservices It s not just request response App redundancy Scale out and statelessness Application configuration Not just environment variables The application lifecycle Accounting for constant change Accessing apps Services routing and service discovery Interaction redundancy Retries and other control loops Fronting services Circuit breakers and API gateways Troubleshooting Finding the needle in the haystack Cloud native data Breaking the data monolith **Systems Programming** Richard John Anthony,2015 **Mastering Akka** Christian Baxter,2016-10-21 Master the art of creating scalable concurrent and reactive applications using Akka About This Book This book will help you cure anemic models with domain driven design We cover major Akka programming concepts such as concurrency scalability and reactivity You will learn concepts like Event Sourcing and CQRS via Akka Persistence Akka Streams Akka Http as well as Akka Clustering Who This Book Is For If you want to use the Lightbend platform to create highly performant reactive applications then this book is for you If you are a Scala developer looking for techniques to use all features of the new Akka release and want to incorporate these solutions in your current or new projects then this book is for you Expert Java developers who want to build scalable concurrent and reactive application will find this book helpful What You Will Learn Use Akka actors to enable parallel execution Build out domain driven design based components like entities and aggregates Respond to command requests on that aggregate root that affect the internal state Leverage Akka Persistence protobuf and Cassandra to save the persistent state of you entities Build out complex processing graphs with the Graph Builder DSL Understand the dynamic push pull nature of backpressure handling within Akka Streams Route HTTP requests to an actor and return a response Deploy actor instances across a set of nodes via ConductR for high availability In Detail For a

programmer writing multi threaded applications is critical as it is important to break large tasks into smaller ones and run them simultaneously Akka is a distributed computing toolkit that uses the abstraction of the Actor model enabling developers to build correct concurrent and distributed applications using Java and Scala with ease The book begins with a quick introduction that simplifies concurrent programming with actors We then proceed to master all aspects of domain driven design We ll teach you how to scale out with Akka Remoting Clustering Finally we introduce Conductr as a means to deploy to and manage microservices across a cluster Style and approach This comprehensive fast paced guide is packed with several real world use cases that will help you understand concepts issues and resolutions while using Akka to create highly performant scalable and concurrency proof reactive applications   Building Scalable Distributed Systems John Crig,2025-08-03 Master the art of building high performance fault tolerant and future proof distributed systems In today s world scalability reliability and speed are no longer optional they re essential Building Scalable Distributed Systems is your hands on guide to designing deploying and managing microservices event driven architectures and cloud native applications that power the world s most resilient platforms Whether you re an experienced backend engineer a cloud architect or a senior developer aiming to take your system design skills to the next level this book gives you practical patterns real world examples and proven strategies for building distributed systems at scale You ll learn how to Design scalable microservices with clear service boundaries and API contracts Implement event driven architectures for real time responsiveness Apply resilience patterns like circuit breakers bulkheads and retries Manage distributed data with partitioning replication and consensus protocols Deploy on cloud native platforms using Kubernetes Docker and serverless Build systems with continuous availability and fault tolerance Plan for security observability and compliance from day one Packed with detailed diagrams code samples and modern best practices this guide bridges theory and implementation so you can confidently build systems that scale and keep them running smoothly in production If you want to design like Google deploy like Netflix and operate with the resilience of Amazon this is the book you need   **Hands-On Serverless Applications with Kotlin** Hardik Trivedi,Ameya Kulkarni,2018-09-29 Choose the right architecture and design it using design patterns to create a serverless application that cuts costs and is easily scalable Key FeaturesDesign enterprise ready serverless applications that effortlessly meet your customers requirementsEffectively deploy manage monitor and orchestrate serverless applications using AWSUse Cloud9 to provision a secured development environment in the cloudBook Description Serverless is a cloud computing execution model where the cloud provider dynamically manages the allocation and provisioning of servers Many companies have started using serverless architectures to cut costs and improve scalability Hands On Serverless Applications with Kotlin is your one stop guide to designing serverless architectures for your applications with AWS and Kotlin To start with you ll explore the fundamentals of serverless architecture and how AWS Lambda functions work You will then learn to design build secure and deploy your application to production In addition to these activities you ll understand how to implement non

functional requirements such as auditing and logging Moving on you ll discover how to scale up and orchestrate serverless applications using an open source framework and handle distributed serverless systems in production By the end of the book you ll have gained the knowledge needed to build scalable and cost efficient Kotlin applications with a serverless framework What you will learnDesign a serverless architectureUse AWS Lambda to contain your serverless APIExplore the various ways to keep serverless apps safe and secureUnderstand how a serverless API allows you to use huge infrastructure and cut costsDiscover how to handle distributed systems in KotlinDesign the data flow between cloud services and custom business logicSecure your Kotlin AWS serverless applicationMaster Kotlin design patterns for serverless applicationsWho this book is for Hands On Serverless Applications with Kotlin is for you if you are a Kotlin developer who wants to learn about serverless architectures It is assumed that you have some knowledge of Kotlin programming and AWS *Akka in Action, Second Edition* Francisco Lopez-Sancho Abraham,2023-09-19 Akka solves the big problems of distributed systems from multithreading and concurrency to scalability and failure Learn how to use it effectively In Akka in Action Second Edition you will learn how to Create basic programs with Akka Typed Work with clusters to build robust fault tolerant programs Use Akka with Kubernetes Build microservices with Akka Create and maintain distributed state with strong consistency guarantees Employ actor based concurrency and parallelism Test Akka software Akka in Action Second Edition teaches you to use Akka Typed to solve common problems of distributed systems You ll learn how to bring together all of Akka s moving parts to design and implement highly scalable and maintainable software Extensively revised by Akka contributor Francisco L pez Sancho Abraham this new edition demonstrates Akka s complex concepts through engaging hands on examples Discover the power of the Actor Model how Akka works with Kubernetes and how to utilize Akka modules to create microservices that are reliable and fault tolerant About the technology For large software systems the action is in the ilities Scalability Reliability Maintainability Capability Akka toolkit for building distributed message driven applications delivers on the ilities And recent innovations including Akka Typed ensure that this amazing platform will remain the best way to build and deploy distributed Java and Scala applications for years to come About the book Akka in Action Second Edition is your guide to building message centric distributed applications systems This new edition covers all features of Akka including Akka Typed You ll learn to create microservices using Akka s powerful suite of tools Akka Sharding Persistence Streams Persistence Query Projections and gRPC Practical examples taken directly from industry guide you through clustering deploying to Kubernetes and taking full advantage of Akka s Actors based approach to concurrency What s inside Work with clusters to build robust fault tolerant programs Maintain distributed systems with strong consistency guarantees Utilize concurrency and parallelism Test Akka software About the reader For readers comfortable with Java and Scala About the author Francisco Lopez Sancho Abraham is a senior consultant at Lightbend and a principal engineer on the Akka Team Raymond Roestenburg Rob Bakker and Rob Williams are the authors of the first edition of Akka in Action Table of Contents 1

Introducing Akka 2 Up and running 3 One actor is no actor 4 Akka test kit 5 Fault tolerance 6 Discovery and routing 7 Configuration 8 Clustering 9 Sharding and persistence 10 Streams persistence queries and projections 11 Akka ports 12 Real world example An Akka betting house 13 Clustering part 2 14 Connecting to systems with Alpakka 15 Akka betting house part 2 16 Akka Streams part 2   *Reactive Application Development* Sean Hanafee,2018 Reactive Application Development is a hands on guide that teaches you how to build reliable enterprise applications using reactive design patterns About the Technology Mission critical applications have to respond instantly to changes in load recover gracefully from failure and satisfy exacting requirements for performance cost and reliability Thats no small task Reactive designs make it easier to meet these demands through modular message driven architecture innovative tooling and cloud based infrastructure About the Book Reactive Application Development teaches you how to build reliable enterprise applications using reactive design patterns This hands on guide begins by exposing you to the reactive mental model along with a survey of core technologies like the Akka actors framework Then youll build a proof of concept system in Scala and learn to use patterns like CQRS and Event Sourcing Youll master the principles of reactive design as you implement elasticity and resilience integrate with traditional architectures and learn powerful testing techniques Whats inside Designing elastic domain models Building fault tolerant systems Efficiently handling large data volumes Examples can be built in Scala or Java About the Reader Written for Java or Scala programmers familiar with distributed application designs About the Authors Duncan DeVore Sean Walsh and Brian Hanafee are seasoned architects with experience building and deploying reactive systems in production   **Reactive Design Patterns Video Edition** Roland Kuhn,2017 Reactive Design Patterns is a clearly written guide for building message driven distributed systems that are resilient responsive and elastic In this book you ll find patterns for messaging flow control resource management and concurrency along with practical issues like test friendly designs All patterns include concrete examples using Scala and Akka Most examples use Scala Java and Akka Readers should be familiar with distributed systems Resource description page

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