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Principles And Best Practices  
Of Scalable Realtime Data  
Systems

# **Big Data Principles And Best Practices Of Scalable Realtime Data Systems**

***Learn the techniques and  
math you need to start  
making sense of your data  
About This Book Enhance  
your knowledge of coding  
with data science theory for  
practical insight into data  
science and analysis More  
than just a math class,  
learn how to perform real-  
world data science tasks  
with R and Python Create***

**actionable insights and transform raw data into tangible value Who This Book Is For You should be fairly well acquainted with basic algebra and should feel comfortable reading snippets of R/Python as well as pseudo code. You should have the urge to learn and apply the techniques put forth in this book on either your own data sets or those provided to you. If you have the basic math skills but want to apply them in data science or you have good programming skills but lack math, then this book is for**

**you. What You Will Learn**  
**Get to know the five most important steps of data science Use your data intelligently and learn how to handle it with care Bridge the gap between mathematics and programming Learn about probability, calculus, and how to use statistical models to control and clean your data and drive actionable results Build and evaluate baseline machine learning models Explore the most effective metrics to determine the success of your machine learning models Create data**

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**visualizations that  
communicate actionable  
insights Read and apply  
machine learning concepts  
to your problems and make  
actual predictions In Detail  
Need to turn your skills at  
programming into effective  
data science skills?**

**Principles of Data Science  
is created to help you join  
the dots between  
mathematics,  
programming, and business  
analysis. With this book,  
you'll feel confident about  
asking—and  
answering—complex and  
sophisticated questions of  
your data to move from**

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***abstract and raw statistics to actionable ideas. With a unique approach that bridges the gap between mathematics and computer science, this books takes you through the entire data science pipeline. Beginning with cleaning and preparing data, and effective data mining strategies and techniques, you'll move on to build a comprehensive picture of how every piece of the data science puzzle fits together. Learn the fundamentals of computational mathematics and statistics, as well as***

**some pseudocode being used today by data scientists and analysts. You'll get to grips with machine learning, discover the statistical models that help you take control and navigate even the densest datasets, and find out how to create powerful visualizations that communicate what your data means. Style and approach This is an easy-to-understand and accessible tutorial. It is a step-by-step guide with use cases, examples, and illustrations to get you well-versed with the concepts of data**

**science. Along with explaining the fundamentals, the book will also introduce you to slightly advanced concepts later on and will help you implement these techniques in the real world.**

**In this book readers will find technological discussions on the existing and emerging technologies across the different stages of the big data value chain. They will learn about legal aspects of big data, the social impact, and about education needs and requirements. And they will**

***discover the business perspective and how big data technology can be exploited to deliver value within different sectors of the economy. The book is structured in four parts: Part I “The Big Data Opportunity” explores the value potential of big data with a particular focus on the European context. It also describes the legal, business and social dimensions that need to be addressed, and briefly introduces the European Commission’s BIG project. Part II “The Big Data Value Chain” details the complete***



***big data lifecycle from a technical point of view, ranging from data acquisition, analysis, curation and storage, to data usage and exploitation. Next, Part III “Usage and Exploitation of Big Data” illustrates the value creation possibilities of big data applications in various sectors, including industry, healthcare, finance, energy, media and public services. Finally, Part IV “A Roadmap for Big Data Research” identifies and prioritizes the cross-sectorial requirements for big data research, and***

**outlines the most urgent and challenging technological, economic, political and societal issues for big data in Europe. This compendium summarizes more than two years of work performed by a leading group of major European research centers and industries in the context of the BIG project. It brings together research findings, forecasts and estimates related to this challenging technological context that is becoming the major axis of the new digitally transformed business environment.**

***Data pipelines are the foundation for success in data analytics. Moving data from numerous diverse sources and transforming it to provide context is the difference between having data and actually gaining value from it. This pocket reference defines data pipelines and explains how they work in today's modern data stack. You'll learn common considerations and key decision points when implementing pipelines, such as batch versus streaming data ingestion and build versus buy. This***

***book addresses the most common decisions made by data professionals and discusses foundational concepts that apply to open source frameworks, commercial products, and homegrown solutions.***

***You'll learn: What a data pipeline is and how it works  
How data is moved and processed on modern data infrastructure, including cloud platforms  
Common tools and products used by data engineers to build pipelines  
How pipelines support analytics and reporting needs***

***Considerations for pipeline***

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Systems  
**maintenance, testing, and  
alerting**

***This open access book is part of the LAMBDA Project (Learning, Applying, Multiplying Big Data Analytics), funded by the European Union, GA No. 809965. Data Analytics involves applying algorithmic processes to derive insights. Nowadays it is used in many industries to allow organizations and companies to make better decisions as well as to verify or disprove existing theories or models. The term data analytics is often***

***used interchangeably with intelligence, statistics, reasoning, data mining, knowledge discovery, and others. The goal of this book is to introduce some of the definitions, methods, tools, frameworks, and solutions for big data processing, starting from the process of information extraction and knowledge representation, via knowledge processing and analytics to visualization, sense-making, and practical applications. Each chapter in this book addresses some pertinent aspect of the data processing chain,***

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**with a specific focus on understanding Enterprise Knowledge Graphs, Semantic Big Data Architectures, and Smart Data Analytics solutions. This book is addressed to graduate students from technical disciplines, to professional audiences following continuous education short courses, and to researchers from diverse areas following self-study courses. Basic skills in computer science, mathematics, and statistics are required.**

**#1 New York Times Bestseller "Significant...The**

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***book is both instructive and surprisingly moving.” —The New York Times Ray Dalio, one of the world’s most successful investors and entrepreneurs, shares the unconventional principles that he’s developed, refined, and used over the past forty years to create unique results in both life and business—and which any person or organization can adopt to help achieve their goals. In 1975, Ray Dalio founded an investment firm, Bridgewater Associates, out of his two-bedroom apartment in New York***



**City. Forty years later, Bridgewater has made more money for its clients than any other hedge fund in history and grown into the fifth most important private company in the United States, according to Fortune magazine. Dalio himself has been named to Time magazine's list of the 100 most influential people in the world. Along the way, Dalio discovered a set of unique principles that have led to Bridgewater's exceptionally effective culture, which he describes as "an idea meritocracy that strives to achieve**

***meaningful work and meaningful relationships through radical transparency.” It is these principles, and not anything special about Dalio—who grew up an ordinary kid in a middle-class Long Island neighborhood—that he believes are the reason behind his success. In Principles, Dalio shares what he’s learned over the course of his remarkable career. He argues that life, management, economics, and investing can all be systemized into rules and understood like machines.***

**The book's hundreds of practical lessons, which are built around his cornerstones of "radical truth" and "radical transparency," include Dalio laying out the most effective ways for individuals and organizations to make decisions, approach challenges, and build strong teams. He also describes the innovative tools the firm uses to bring an idea meritocracy to life, such as creating "baseball cards" for all employees that distill their strengths and weaknesses, and**

**employing computerized decision-making systems to make believability-weighted decisions. While the book brims with novel ideas for organizations and institutions, Principles also offers a clear, straightforward approach to decision-making that Dalio believes anyone can apply, no matter what they're seeking to achieve. Here, from a man who has been called both "the Steve Jobs of investing" and "the philosopher king of the financial universe" (CIO magazine), is a rare opportunity to gain proven**

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**advice unlike anything  
you'll find in the  
conventional business  
press.**

**Principles**

**Computational Intelligence  
for System Optimization  
and Grid Integration**

**Data Science from Scratch  
Principles and**

**Fundamentals using  
Hadoop and Spark**

**Data Feminism**

**Big Data, Big Brother?**

**Principles and Practice**

Summary Hadoop in Practice,  
Second Edition provides over  
100 tested, instantly useful  
techniques that will help  
you conquer big data, using  
Hadoop. This revised new

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edition covers changes and new features in the Hadoop core architecture, including MapReduce 2. Brand new chapters cover YARN and integrating Kafka, Impala, and Spark SQL with Hadoop. You'll also get new and updated techniques for Flume, Sqoop, and Mahout, all of which have seen major new versions recently. In short, this is the most practical, up-to-date coverage of Hadoop available anywhere. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Book It's always a good time to upgrade your Hadoop skills!

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Hadoop in Practice, Second Edition provides a collection of 104 tested, instantly useful techniques for analyzing real-time streams, moving data securely, machine learning, managing large-scale clusters, and taming big data using Hadoop. This completely revised edition covers changes and new features in Hadoop core, including MapReduce 2 and YARN. You'll pick up hands-on best practices for integrating Spark, Kafka, and Impala with Hadoop, and get new and updated techniques for the latest versions of Flume, Sqoop, and Mahout. In short, this

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is the most practical, up-to-date coverage of Hadoop available. Readers need to know a programming language like Java and have basic familiarity with Hadoop. What's Inside Thoroughly updated for Hadoop 2 How to write YARN applications Integrate real-time technologies like Storm, Impala, and Spark Predictive analytics using Mahout and RR Readers need to know a programming language like Java and have basic familiarity with Hadoop. About the Author Alex Holmes works on tough big-data problems. He is a software engineer, author, speaker, and blogger specializing in



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large-scale Hadoop projects.

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Big Data: Principles and

Paradigms captures the state-

of-the-art research on the

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architectural aspects, technologies, and applications of Big Data. The book identifies potential future directions and technologies that facilitate insight into numerous scientific, business, and consumer applications. To help realize Big Data's full potential, the book addresses numerous challenges, offering the conceptual and technological solutions for tackling them. These challenges include life-cycle data management, large-scale storage, flexible processing infrastructure, data modeling, scalable machine

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learning, data analysis algorithms, sampling techniques, and privacy and ethical issues. Covers computational platforms supporting Big Data applications Addresses key principles underlying Big Data computing Examines key developments supporting next generation Big Data platforms Explores the challenges in Big Data computing and ways to overcome them Contains expert contributors from both academia and industry From the Foreword: "Big Data Management and Processing is [a] state-of-the-art book that deals with a wide range of topical themes in the

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field of Big Data. The book, which probes many issues related to this exciting and rapidly growing field, covers processing, management, analytics, and applications... [It] is a very valuable addition to the literature. It will serve as a source of up-to-date research in this continuously developing area. The book also provides an opportunity for researchers to explore the use of advanced computing technologies and their impact on enhancing our capabilities to conduct more sophisticated studies."

---Sartaj Sahni, University of Florida, USA "Big Data

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Management and Processing covers the latest Big Data research results in processing, analytics, management and applications. Both fundamental insights and representative applications are provided. This book is a timely and valuable resource for students, researchers and seasoned practitioners in Big Data fields. --Hai Jin, Huazhong University of Science and Technology, China Big Data Management and Processing explores a range of big data related issues and their impact on the design of new computing systems. The twenty-one chapters were carefully

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selected and feature contributions from several outstanding researchers. The book endeavors to strike a balance between theoretical and practical coverage of innovative problem solving techniques for a range of platforms. It serves as a repository of paradigms, technologies, and applications that target different facets of big data computing systems. The first part of the book explores energy and resource management issues, as well as legal compliance and quality management for Big Data. It covers In-Memory computing and In-Memory data grids, as well as co-

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scheduling for high performance computing applications. The second part of the book includes comprehensive coverage of Hadoop and Spark, along with security, privacy, and trust challenges and solutions. The latter part of the book covers mining and clustering in Big Data, and includes applications in genomics, hospital big data processing, and vehicular cloud computing. The book also analyzes funding for Big Data projects.

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Get complete instructions

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for manipulating, processing, cleaning, and crunching datasets in Python. Updated for Python 3.6, the second edition of this hands-on guide is packed with practical case studies that show you how to solve a broad set of data analysis problems effectively. You'll learn the latest versions of pandas, NumPy, IPython, and Jupyter in the process. Written by Wes McKinney, the creator of the Python pandas project, this book is a practical, modern introduction to data science tools in Python. It's ideal for analysts new to Python and for Python programmers



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new to data science and scientific computing. Data files and related material are available on GitHub. Use the IPython shell and Jupyter notebook for exploratory computing Learn basic and advanced features in NumPy (Numerical Python) Get started with data analysis tools in the pandas library Use flexible tools to load, clean, transform, merge, and reshape data Create informative visualizations with matplotlib Apply the pandas groupby facility to slice, dice, and summarize datasets Analyze and manipulate regular and irregular time series data Learn how to

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solve real-world data  
analysis problems with  
thorough, detailed examples  
A guide to building  
proficiency in tools and  
systems used by leading big  
data experts

Principles of Data Wrangling  
How to Monetize, Manage, and  
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Reliable, Scalable, and  
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Concepts, Drivers &  
Techniques

Find the right big data solution for  
your business or organization Big

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data management is one of the major challenges facing business, industry, and not-for-profit organizations. Data sets such as customer transactions for a mega-retailer, weather patterns monitored by meteorologists, or social network activity can quickly outpace the capacity of traditional data management tools. If you need to develop or manage big data solutions, you'll appreciate how these four experts define, explain, and guide you through this new and often confusing concept. You'll learn what it is, why it matters, and how to choose and implement solutions that work. Effectively managing big data is an

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issue of growing importance to businesses, not-for-profit organizations, government, and IT professionals. Authors are experts in information management, big data, and a variety of solutions. Explains big data in detail and discusses how to select and implement a solution, security concerns to consider, data storage and presentation issues, analytics, and much more. Provides essential information in a no-nonsense, easy-to-understand style that is empowering. Big Data For Dummies cuts through the confusion and helps you take charge of big data solutions for your organization.

Data science libraries, frameworks,

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modules, and toolkits are great for doing data science, but they're also a good way to dive into the discipline without actually understanding data science. In this book, you'll learn how many of the most fundamental data science tools and algorithms work by implementing them from scratch. If you have an aptitude for mathematics and some programming skills, author Joel Grus will help you get comfortable with the math and statistics at the core of data science, and with hacking skills you need to get started as a data scientist.

Today's messy glut of data holds answers to questions no one's even thought to ask. This book

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provides you with the know-how to dig those answers out. Get a crash course in Python Learn the basics of linear algebra, statistics, and probability—and understand how and when they're used in data science Collect, explore, clean, munge, and manipulate data Dive into the fundamentals of machine learning Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks, and clustering Explore recommender systems, natural language processing, network analysis, MapReduce, and databases

A key task that any aspiring data-driven organization needs to learn

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is data wrangling, the process of converting raw data into something truly useful. This practical guide provides business analysts with an overview of various data wrangling techniques and tools, and puts the practice of data wrangling into context by asking, "What are you trying to do and why?" Wrangling data consumes roughly 50-80% of an analyst ' s time before any kind of analysis is possible. Written by key executives at Trifacta, this book walks you through the wrangling process by exploring several factors—time, granularity, scope, and structure—that you need to consider as you begin to work with data. You ' ll learn a shared language and a

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comprehensive understanding of data wrangling, with an emphasis on recent agile analytic processes used by many of today ' s data-driven organizations. Appreciate the importance—and the satisfaction—of wrangling data the right way. Understand what kind of data is available Choose which data to use and at what level of detail Meaningfully combine multiple sources of data Decide how to distill the results to a size and shape that can drive downstream analysis

Summary Real-World Machine Learning is a practical guide designed to teach working developers the art of ML project execution. Without overdosing you



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on academic theory and complex mathematics, it introduces the day-to-day practice of machine learning, preparing you to successfully build and deploy powerful ML systems. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology Machine learning systems help you find valuable insights and patterns in data, which you'd never recognize with traditional methods. In the real world, ML techniques give you a way to identify trends, forecast behavior, and make fact-based recommendations. It's a hot and growing field, and up-to-speed ML developers are in demand.

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About the Book Real-World Machine Learning will teach you the concepts and techniques you need to be a successful machine learning practitioner without overdosing you on abstract theory and complex mathematics. By working through immediately relevant examples in Python, you'll build skills in data acquisition and modeling, classification, and regression. You'll also explore the most important tasks like model validation, optimization, scalability, and real-time streaming. When you're done, you'll be ready to successfully build, deploy, and maintain your own powerful ML systems. What's Inside Predicting future behavior Performance

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evaluation and optimization  
Analyzing sentiment and making  
recommendations About the  
Reader No prior machine learning  
experience assumed. Readers  
should know Python. About the  
Authors Henrik Brink, Joseph  
Richards and Mark Fetherolf are  
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engaged in the daily practice of  
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Written by renowned data science experts Foster Provost and Tom Fawcett, *Data Science for Business* introduces the fundamental principles of data science, and walks you through the "data-analytic thinking" necessary for extracting useful knowledge and business value from the data you collect. This guide also helps you understand the many data-mining techniques in use today. Based on an MBA course Provost has taught at New York University over the past ten years, *Data Science for Business* provides examples of real-

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world business problems to illustrate these principles. You ' ll not only learn how to improve communication between business stakeholders and data scientists, but also how participate intelligently in your company ' s data science projects. You ' ll also discover how to think data-analytically, and fully appreciate how data science methods can support business decision-making. Understand how data science fits in your organization—and how you can use it for competitive advantage Treat data as a business asset that requires careful investment if you ' re to gain real value Approach business problems data-analytically, using the data-

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mining process to gather good data  
in the most appropriate way Learn  
general concepts for actually  
extracting knowledge from data  
Apply data science principles when  
interviewing data science job  
candidates

Foundations of Data Intensive  
Applications

Big Data Computing

Big Data Management

Information Governance Principles  
and Practices for a Big Data  
Landscape

Data Science for Business

Python for Data Analysis

From Mainframes to Big Data

*The data lake is a daring new  
approach for harnessing the power  
of big data technology and*

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*providing convenient self-service capabilities. But is it right for your company? This book is based on discussions with practitioners and executives from more than a hundred organizations, ranging from data-driven companies such as Google, LinkedIn, and Facebook, to governments and traditional corporate enterprises. You'll learn what a data lake is, why enterprises need one, and how to build one successfully with the best practices in this book. Alex Gorelik, CTO and founder of Waterline Data, explains why old systems and processes can no longer support data needs in the enterprise. Then, in a collection of essays about data lake*

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*implementation, you'll examine data lake initiatives, analytic projects, experiences, and best practices from data experts working in various industries. Get a succinct introduction to data warehousing, big data, and data science Learn various paths enterprises take to build a data lake Explore how to build a self-service model and best practices for providing analysts access to the data Use different methods for architecting your data lake Discover ways to implement a data lake from experts in different industries*

*Provides a roadmap for understanding the relationship between technology and human rights law and practice. This title is*



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*also available as Open Access.*

*Introductory, theory-practice  
balanced text teaching the  
fundamentals of databases to  
advanced undergraduates or  
graduate students in information  
systems or computer science.  
Build, monitor, and manage real-  
time data pipelines to create data  
engineering infrastructure efficiently  
using open-source Apache projects  
Key Features Become well-versed  
in data architectures, data  
preparation, and data optimization  
skills with the help of practical  
examples Design data models and  
learn how to extract, transform, and  
load (ETL) data using  
Python Schedule, automate, and  
monitor complex data pipelines in*

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*productionBook Description Data engineering provides the foundation for data science and analytics, and forms an important part of all businesses. This book will help you to explore various tools and methods that are used for understanding the data engineering process using Python. The book will show you how to tackle challenges commonly faced in different aspects of data engineering. You'll start with an introduction to the basics of data engineering, along with the technologies and frameworks required to build data pipelines to work with large datasets. You'll learn how to transform and clean data and perform analytics to get*

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*the most out of your data. As you advance, you'll discover how to work with big data of varying complexity and production databases, and build data pipelines. Using real-world examples, you'll build architectures on which you'll learn how to deploy data pipelines. By the end of this Python book, you'll have gained a clear understanding of data modeling techniques, and will be able to confidently build data engineering pipelines for tracking data, running quality checks, and making necessary changes in production. What you will learn Understand how data engineering supports data science workflows Discover how to extract*

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*data from files and databases and then clean, transform, and enrich it. Configure processors for handling different file formats as well as both relational and NoSQL databases. Find out how to implement a data pipeline and dashboard to visualize results. Use staging and validation to check data before landing in the warehouse. Build real-time pipelines with staging areas that perform validation and handle failures. Get to grips with deploying pipelines in the production environment. Who this book is for: This book is for data analysts, ETL developers, and anyone looking to get started with or transition to the field of data engineering or refresh their*

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*knowledge of data engineering using Python. This book will also be useful for students planning to build a career in data engineering or IT professionals preparing for a transition. No previous knowledge of data engineering is required. Data-intensive systems are a technological building block supporting Big Data and Data Science applications. This book familiarizes readers with core concepts that they should be aware of before continuing with independent work and the more advanced technical reference literature that dominates the current landscape. The material in the book is structured following a problem-based approach. This means that*

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*the content in the chapters is focused on developing solutions to simplified, but still realistic problems using data-intensive technologies and approaches. The reader follows one reference scenario through the whole book, that uses an open Apache dataset. The origins of this volume are in lectures from a master's course in Data-intensive Systems, given at the University of Stavanger. Some chapters were also a base for guest lectures at Purdue University and Lodz University of Technology.*

*Principles of Database*

*Management*

*Principles of Data Integration*

*Data Governance Principles for Big*

*Data Analytics*

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*New Technologies for Human  
Rights Law and Practice*

*Big Data Governance*

*Data Privacy*

*A Roadmap for Usage and  
Exploitation of Big Data in Europe*

The Structure of Digital  
Computing takes a fifty year  
perspective on computing and  
discusses what is significant,  
what is novel, what endures, and  
why it is all so confusing. The  
book tries to balance two point of  
views: digital computing as  
viewed from a business  
perspective, where the focus is on  
marketing and selling, and digital  
computing from a research  
perspective, where the focus is on  
developing fundamentally new  
technology.

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Summary Big Data teaches you to build big data systems using an architecture that takes advantage of clustered hardware along with new tools designed specifically to capture and analyze web-scale data. It describes a scalable, easy-to-understand approach to big data systems that can be built and run by a small team.

Following a realistic example, this book guides readers through the theory of big data systems, how to implement them in practice, and how to deploy and operate them once they're built. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Book Web-scale applications like social networks, real-time analytics, or e-



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commerce sites deal with a lot of data, whose volume and velocity exceed the limits of traditional database systems. These applications require architectures built around clusters of machines to store and process data of any size, or speed. Fortunately, scale and simplicity are not mutually exclusive. Big Data teaches you to build big data systems using an architecture designed specifically to capture and analyze web-scale data. This book presents the Lambda Architecture, a scalable, easy-to-understand approach that can be built and run by a small team. You'll explore the theory of big data systems and how to implement them in practice. In addition to discovering a general

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framework for processing big data, you'll learn specific technologies like Hadoop, Storm, and NoSQL databases. This book requires no previous exposure to large-scale data analysis or NoSQL tools. Familiarity with traditional databases is helpful.

What's Inside Introduction to big data systems Real-time processing of web-scale data Tools like Hadoop, Cassandra, and Storm Extensions to traditional database skills About the Authors Nathan Marz is the creator of Apache Storm and the originator of the Lambda Architecture for big data systems. James Warren is an analytics architect with a background in machine learning and scientific computing. Table of Contents A

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new paradigm for Big Data PART 1 BATCH LAYER Data model for Big Data Data model for Big Data: Illustration Data storage on the batch layer Data storage on the batch layer: Illustration Batch layer Batch layer: Illustration An example batch layer: Architecture and algorithms An example batch layer: Implementation PART 2 SERVING LAYER Serving layer Serving layer: Illustration PART 3 SPEED LAYER Realtime views Realtime views: Illustration Queuing and stream processing Queuing and stream processing: Illustration Micro-batch stream processing Micro-batch stream processing: Illustration Lambda Architecture in depth This book provides readers with a thorough understanding of

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various research areas within the field of data science. The book introduces readers to various techniques for data acquisition, extraction, and cleaning, data summarizing and modeling, data analysis and communication techniques, data science tools, deep learning, and various data science applications. Researchers can extract and conclude various future ideas and topics that could result in potential publications or thesis. Furthermore, this book contributes to Data Scientists' preparation and to enhancing their knowledge of the field. The book provides a rich collection of manuscripts in highly regarded data science topics, edited by professors with long experience in the field of data science.

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Introduces various techniques, methods, and algorithms adopted by Data Science experts Provides a detailed explanation of data science perceptions, reinforced by practical examples Presents a road map of future trends suitable for innovative data science research and practice Data is the new Gold and Analytics is the machinery to mine, mold and mint it. Data analytics has become core to business and decision making. The rapid increase in data volume, velocity and variety, known as big data, offers both opportunities and challenges. While open source solutions to store big data, like Hadoop and NoSQL offer platforms for exploring value and insight from

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big data, they were not originally developed with data security and governance in mind.

Organizations that are launching big data initiatives face significant challenges for managing this data effectively. In this book, the author has collected best practices from the world's leading organizations who have successfully implemented big data platforms. He offers the latest techniques and methods for managing big data effectively.

The book offers numerous policies, strategies and recipes for managing big data. It addresses many issues that are prevalent with data security, privacy, controls and life cycle management offering modern principles and open source

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architectures for successful governance of big data. Topics that cover the entire data management life cycle, data quality, data stewardship, regulatory considerations, data council, architectural and operational models are presented for successful management of big data. The book is a must-read for data scientists, data engineers and information technology leaders who are implementing big data platforms in their organizations.

The book covers data privacy in depth with respect to data mining, test data management, synthetic data generation etc. It formalizes principles of data privacy that are essential for good anonymization design based

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on the data format and discipline.

The principles outline best practices and reflect on the conflicting relationship between privacy and utility. From a practice standpoint, it provides practitioners and researchers with a definitive guide to approach anonymization of various data formats, including multidimensional, longitudinal, time-series, transaction, and graph data. In addition to helping CIOs protect confidential data, it also offers a guideline as to how this can be implemented for a wide range of data at the enterprise level.

Big Data Analytics for Cyber-Physical Systems

Data Wrangling with Pandas, NumPy, and IPython



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Machine Learning for the Internet  
of Things  
Practical Techniques for Data  
Preparation  
Big Data Fundamentals  
The Structure of Digital  
Computing  
Infonomics

*This IBM® Redbooks® publication describes how the IBM Big Data Platform provides the integrated capabilities that are required for the adoption of Information Governance in the big data landscape. As organizations embark on new use cases, such as Big Data Exploration, an enhanced 360 view of customers, or Data Warehouse modernization, and absorb ever growing volumes and variety of data with accelerating velocity, the principles and practices of*

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*Information Governance become ever more critical to ensure trust in data and help organizations overcome the inherent risks and achieve the wanted value. The introduction of big data changes the information landscape. Data arrives faster than humans can react to it, and issues can quickly escalate into significant events. The variety of data now poses new privacy and security risks. The high volume of information in all places makes it harder to find where these issues, risks, and even useful information to drive new value and revenue are. Information Governance provides an organization with a framework that can align their wanted outcomes with their strategic management principles, the people who can implement those*

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*principles, and the architecture and platform that are needed to support the big data use cases. The IBM Big Data Platform, coupled with a framework for Information Governance, provides an approach to build, manage, and gain significant value from the big data landscape.*

*This revelatory exploration of big data, which refers to our newfound ability to crunch vast amounts of information, analyze it instantly and draw profound and surprising conclusions from it, discusses how it will change our lives and what we can do to protect ourselves from its hazards. 75,000 first printing.*

*Big Data Analytics in Cyber-Physical Systems: Machine Learning for the Internet of Things examines sensor*

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*signal processing, IoT gateways, optimization and decision-making, intelligent mobility, and implementation of machine learning algorithms in embedded systems. This book focuses on the interaction between IoT technology and the mathematical tools used to evaluate the extracted data of those systems. Each chapter provides the reader with a broad list of data analytics and machine learning methods for multiple IoT applications. Additionally, this volume addresses the educational transfer needed to incorporate these technologies into our society by examining new platforms for IoT in schools, new courses and concepts for universities and adult education on IoT and data science. . Bridges the gap*

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*between IoT, CPS, and mathematical modelling. Features numerous use cases that discuss how concepts are applied in different domains and applications. Provides "best practices", "winning stories" and "real-world examples" to complement innovation. Includes highlights of mathematical foundations of signal processing and machine learning in CPS and IoT. Big Data, gathered together and re-analysed, can be used to form endless variations of our persons - so-called 'data doubles'. Whilst never a precise portrayal of who we are, they unarguably contain glimpses of details about us that, when deployed into various routines (such as management, policing and advertising) can affect us in many ways. How are we to deal with*

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*Big Data? When is it beneficial to us? When is it harmful? How might we regulate it? Offering careful and critical analyses, this timely volume aims to broaden well-informed, unprejudiced discourse, focusing on: the tenets of Big Data, the politics of governance and regulation; and Big Data practices, performance and resistance. An interdisciplinary volume, *The Politics of Big Data* will appeal to undergraduate and postgraduate students, as well as postdoctoral and senior researchers interested in fields such as Technology, Politics and Surveillance.*

*“This text should be required reading for everyone in contemporary business.” --Peter Woodhull, CEO, Modus21 “The one book that clearly*

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*describes and links Big Data concepts to business utility.*” --Dr. Christopher

*Starr, PhD “Simply, this is the best Big Data book on the market!”* --Sam

*Rostam, Cascadian IT Group “...one of the most contemporary approaches I’ve seen to Big Data fundamentals...”*

*--Joshua M. Davis, PhD The Definitive Plain-English Guide to Big Data for Business and Technology Professionals Big Data Fundamentals provides a*

*pragmatic, no-nonsense introduction to Big Data. Best-selling IT author*

*Thomas Erl and his team clearly*

*explain key Big Data concepts, theory and terminology, as well as*

*fundamental technologies and*

*techniques. All coverage is supported with case study examples and*

*numerous simple diagrams. The*

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*authors begin by explaining how Big Data can propel an organization forward by solving a spectrum of previously intractable business problems. Next, they demystify key analysis techniques and technologies and show how a Big Data solution environment can be built and integrated to offer competitive advantages. Discovering Big Data's fundamental concepts and what makes it different from previous forms of data analysis and data science*

*Understanding the business motivations and drivers behind Big Data adoption, from operational improvements through innovation*

*Planning strategic, business-driven Big Data initiatives*

*Addressing considerations such as data*



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*management, governance, and security*  
*Recognizing the 5 “V” characteristics*  
*of datasets in Big Data environments:*  
*volume, velocity, variety, veracity, and*  
*value Clarifying Big Data’s*  
*relationships with OLTP, OLAP, ETL,*  
*data warehouses, and data marts*  
*Working with Big Data in structured,*  
*unstructured, semi-structured, and*  
*metadata formats Increasing value by*  
*integrating Big Data resources with*  
*corporate performance monitoring*  
*Understanding how Big Data leverages*  
*distributed and parallel processing*  
*Using NoSQL and other technologies*  
*to meet Big Data’s distinct data*  
*processing requirements Leveraging*  
*statistical approaches of quantitative*  
*and qualitative analysis Applying*  
*computational analysis methods,*

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*including machine learning*  
*Big Data Architect's Handbook*  
*What You Need to Know about Data*  
*Mining and Data-Analytic Thinking*

*The Enterprise Big Data Lake*  
*A Revolution that Will Transform how*  
*We Live, Work, and Think*  
*Data-intensive Systems*  
*Principles of Big Data*

Data analytics is core to business and decision making. The rapid increase in data volume, velocity and variety offers both opportunities and challenges. While open source solutions to store big data, like Hadoop, offer platforms for exploring value and insight from big data, they were not originally developed with data security and governance in mind. Big Data Management discusses

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numerous policies, strategies and recipes for managing big data. It addresses data security, privacy, controls and life cycle management offering modern principles and open source architectures for successful governance of big data. The author has collected best practices from the world's leading organizations that have successfully implemented big data platforms. The topics discussed cover the entire data management life cycle, data quality, data stewardship, regulatory considerations, data council, architectural and operational models are presented for successful management of big data. The book is a must-read for data scientists, data engineers and corporate leaders who are implementing big data platforms in their organizations.

A new way of thinking about data

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science and data ethics that is informed by the ideas of intersectional feminism. Today, data science is a form of power. It has been used to expose injustice, improve health outcomes, and topple governments. But it has also been used to discriminate, police, and surveil. This potential for good, on the one hand, and harm, on the other, makes it essential to ask: Data science by whom? Data science for whom? Data science with whose interests in mind? The narratives around big data and data science are overwhelmingly white, male, and techno-heroic. In *Data Feminism*, Catherine D'Ignazio and Lauren Klein present a new way of thinking about data science and data ethics—one that is informed by intersectional feminist thought. Illustrating data feminism in action,

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D'Ignazio and Klein show how challenges to the male/female binary can help challenge other hierarchical (and empirically wrong) classification systems. They explain how, for example, an understanding of emotion can expand our ideas about effective data visualization, and how the concept of invisible labor can expose the significant human efforts required by our automated systems. And they show why the data never, ever “speak for themselves.” Data Feminism offers strategies for data scientists seeking to learn how feminism can help them work toward justice, and for feminists who want to focus their efforts on the growing field of data science. But Data Feminism is about much more than gender. It is about power, about who has it and who doesn't, and about how those differentials of power can be

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challenged and changed.

Due to market forces and technological evolution, Big Data computing is developing at an increasing rate. A wide variety of novel approaches and tools have emerged to tackle the challenges of Big Data, creating both more opportunities and more challenges for students and professionals in the field of data computation and analysis. Presenting a mix of industry cases and theory, Big Data Computing discusses the technical and practical issues related to Big Data in intelligent information management. Emphasizing the adoption and diffusion of Big Data tools and technologies in industry, the book introduces a broad range of Big Data concepts, tools, and techniques. It covers a wide range of research, and provides comparisons between

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state-of-the-art approaches.

Comprised of five sections, the book focuses on: What Big Data is and why it is important Semantic technologies Tools and methods Business and economic perspectives Big Data applications across industries Many senior executives talk about information as one of their most important assets, but few behave as if it is. They report to the board on the health of their workforce, their financials, their customers, and their partnerships, but rarely the health of their information assets. Corporations typically exhibit greater discipline in tracking and accounting for their office furniture than their data. Infonomics is the theory, study, and discipline of asserting economic significance to information. It strives to apply both economic and asset management

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principles and practices to the valuation, handling, and deployment of information assets. This book specifically shows: CEOs and business leaders how to more fully wield information as a corporate asset CIOs how to improve the flow and accessibility of information CFOs how to help their organizations measure the actual and latent value in their information assets. More directly, this book is for the burgeoning force of chief data officers (CDOs) and other information and analytics leaders in their valiant struggle to help their organizations become more infosavvy. Author Douglas Laney has spent years researching and developing Infonomics and advising organizations on the infinite opportunities to monetize, manage, and measure information. This book delivers a set of



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new ideas, frameworks, evidence, and even approaches adapted from other disciplines on how to administer, wield, and understand the value of information. Infonomics can help organizations not only to better develop, sell, and market their offerings, but to transform their organizations altogether.

A comprehensive end-to-end guide that gives hands-on practice in big data and Artificial Intelligence Key Features Learn to build and run a big data application with sample code Explore examples to implement activities that a big data architect performs Use Machine Learning and AI for structured and unstructured data Book Description The big data architects are the “masters” of data, and hold high value in today’s market. Handling big data, be it of good or bad

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quality, is not an easy task. The prime job for any big data architect is to build an end-to-end big data solution that integrates data from different sources and analyzes it to find useful, hidden insights. Big Data Architect's Handbook takes you through developing a complete, end-to-end big data pipeline, which will lay the foundation for you and provide the necessary knowledge required to be an architect in big data. Right from understanding the design considerations to implementing a solid, efficient, and scalable data pipeline, this book walks you through all the essential aspects of big data. It also gives you an overview of how you can leverage the power of various big data tools such as Apache Hadoop and ElasticSearch in order to bring them together and build an efficient big data

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solution. By the end of this book, you will be able to build your own design system which integrates, maintains, visualizes, and monitors your data. In addition, you will have a smooth design flow in each process, putting insights in action. What you will learn

Learn Hadoop Ecosystem and Apache projects Understand, compare NoSQL database and essential software architecture Cloud infrastructure design considerations for big data Explore application scenario of big data tools for daily activities Learn to analyze and visualize results to uncover valuable insights Build and run a big data application with sample code from end to end Apply Machine Learning and AI to perform big data intelligence Practice the daily activities performed by big data architects Who this book is for Big Data Architect's

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Handbook is for you if you are an aspiring data professional, developer, or IT enthusiast who aims to be an all-round architect in big data. This book is your one-stop solution to enhance your knowledge and carry out easy to complex activities required to become a big data architect.

Real-World Machine Learning

Designing Data-Intensive Applications

Mastering Spark with R

Work with massive datasets to design data models and automate data pipelines using Python

The Practical Guide to Storing, Managing and Analyzing Big and Small Data

Large Scale Data Analytics under the Hood

Ocean Energy Modeling and Simulation with Big Data

PEEK "UNDER THE HOOD" OF

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BIG DATA ANALYTICS The world of big data analytics grows ever more complex. And while many people can work superficially with specific frameworks, far fewer understand the fundamental principles of large-scale, distributed data processing systems and how they operate. In Foundations of Data Intensive Applications: Large Scale Data Analytics under the Hood, renowned big-data experts and computer

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scientists Drs. Supun Kamburugamuve and Saliya Ekanayake deliver a practical guide to applying the principles of big data to software development for optimal performance. The authors discuss foundational components of large-scale data systems and walk readers through the major software design decisions that define performance, application type, and usability. You will learn how to recognize problems in your applications

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resulting in performance and distributed operation issues, diagnose them, and effectively eliminate them by relying on the bedrock big data principles explained within. Moving beyond individual frameworks and APIs for data processing, this book unlocks the theoretical ideas that operate under the hood of every big data processing system. Ideal for data scientists, data architects, dev-ops

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engineers, and  
developers, Foundations  
of Data Intensive  
Applications: Large  
Scale Data Analytics  
under the Hood shows  
readers how to: Identify  
the foundations of large-  
scale, distributed data  
processing systems Make  
major software design  
decisions that optimize  
performance Diagnose  
performance problems and  
distributed operation  
issues Understand state-  
of-the-art research in  
big data Explain and use  
the major big data



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frameworks and understand what underpins them Use big data analytics in the real world to solve practical problems Data is at the center of many challenges in system design today. Difficult issues need to be figured out, such as scalability, consistency, reliability, efficiency, and maintainability. In addition, we have an overwhelming variety of tools, including relational databases,

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NoSQL datastores, stream or batch processors, and message brokers. What are the right choices for your application? How do you make sense of all these buzzwords? In this practical and comprehensive guide, author Martin Kleppmann helps you navigate this diverse landscape by examining the pros and cons of various technologies for processing and storing data. Software keeps changing, but the fundamental principles

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remain the same. With this book, software engineers and architects will learn how to apply those ideas in practice, and how to make full use of data in modern applications. Peer under the hood of the systems you already use, and learn how to use and operate them more effectively. Make informed decisions by identifying the strengths and weaknesses of different tools. Navigate the trade-offs around consistency,

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scalability, fault tolerance, and complexity Understand the distributed systems research upon which modern databases are built Peek behind the scenes of major online services, and learn from their architectures

If you're like most R users, you have deep knowledge and love for statistics. But as your organization continues to collect huge amounts of data, adding tools such as Apache Spark makes a lot of sense.

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With this practical book, data scientists and professionals working with large-scale data applications will learn how to use Spark from R to tackle big data and big compute problems. Authors Javier Luraschi, Kevin Kuo, and Edgar Ruiz show you how to use R with Spark to solve different data analysis problems. This book covers relevant data science topics, cluster computing, and issues that should interest even the most

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advanced users. Analyze, explore, transform, and visualize data in Apache Spark with R Create statistical models to extract information and predict outcomes; automate the process in production-ready workflows Perform analysis and modeling across many machines using distributed computing techniques Use large-scale data from multiple sources and different formats with ease from within Spark Learn about alternative

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modeling frameworks for graph processing, geospatial analysis, and genomics at scale Dive into advanced topics including custom transformations, real-time data processing, and creating custom Spark extensions Principles of Big Data helps readers avoid the common mistakes that endanger all Big Data projects. By stressing simple, fundamental concepts, this book teaches readers how to organize large volumes

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of complex data, and how to achieve data permanence when the content of the data is constantly changing. General methods for data verification and validation, as specifically applied to Big Data resources, are stressed throughout the book. The book demonstrates how adept analysts can find relationships among data objects held in disparate Big Data resources, when the data objects are endowed with



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semantic support (i.e., organized in classes of uniquely identified data objects). Readers will learn how their data can be integrated with data from other resources, and how the data extracted from Big Data resources can be used for purposes beyond those imagined by the data creators. Learn general methods for specifying Big Data in a way that is understandable to humans and to computers Avoid the pitfalls in Big Data

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design and analysis  
Understand how to create  
and use Big Data safely  
and responsibly with a  
set of laws, regulations  
and ethical standards  
that apply to the  
acquisition,  
distribution and  
integration of Big Data  
resources

Ocean Energy Modeling  
and Simulation with Big  
Data: Computational  
Intelligence for System  
Optimization and Grid  
Integration offers the  
fundamental and  
practical aspects of big

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data solutions applied to ocean and offshore energy systems. The book explores techniques for assessment of tidal, wave and offshore wind energy systems. It presents the use of data mining software to simulate systems and Hadoop technology to evaluate control systems. The use of Map Reduce algorithms in systems optimization is examined, along with the application of NoSQL in systems management. Actual data collection

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through web-based applications and social networks is discussed, along with practical applications of recommendations.

Introduces computational methods for processing and analyzing data to predict ocean energy system production, assess their efficiency, and ensure their reliable connection to power grids Covers data processing solutions like Hadoop, NoSQL, Map Reduce and Lambda, discussing their

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applications in ocean  
energy for system design  
and optimization  
Provides practical  
exercises that  
demonstrate the concepts  
explored in each chapter  
Knowledge Graphs and Big  
Data Processing  
First Principles with  
Python  
Data Pipelines Pocket  
Reference  
Big Data  
New Horizons for a Data-  
Driven Economy  
Principles and Best  
Practices of Scalable  
Realtime Data Systems

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Data Engineering with  
Python

How do you approach answering queries when your data is stored in multiple databases that were designed independently by different people? This is first comprehensive book on data integration and is written by three of the most respected experts in the field. This book provides an extensive introduction to the theory and concepts underlying today's data integration techniques, with detailed, instruction for their application using concrete examples throughout

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to explain the concepts. Data integration is the problem of answering queries that span multiple data sources (e.g., databases, web pages). Data integration problems surface in multiple contexts, including enterprise information integration, query processing on the Web, coordination between government agencies and collaboration between scientists. In some cases, data integration is the key bottleneck to making progress in a field. The authors provide a working knowledge of data integration concepts and techniques, giving you the

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tools you need to develop a complete and concise package of algorithms and applications. Offers a range of data integration solutions enabling you to focus on what is most relevant to the problem at hand Enables you to build your own algorithms and implement your own data integration applications

Hadoop in Practice

Big Data Management and Processing

Preparing, Sharing, and Analyzing Complex Information

The Politics and Policies of Big Data



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Principles for Hadoop, Nosql &  
Big Data Analytics  
Principles and Paradigms  
The Complete Guide to Large-  
Scale Analysis and Modeling