

Apache Spark Tutorial

Apache Spark is a data analytics engine. These series of Spark Tutorials deal with Apache Spark Basics and Libraries : Spark MLlib, GraphX, Streaming, SQL with detailed explanation and examples.



Apache Spark Tutorial

Following are an overview of the concepts and examples that we shall go through in these Apache Spark Tutorials.

Spark Core

Spark Core is the base framework of Apache Spark. It contains distributed task Dispatcher, Job Scheduler and Basic I/O functionalities handler. It exposes these components and their functionalities through APIs available in programming languages Java, Python, Scala and R.

To get started with Apache Spark Core concepts and setup :

- [Install Spark on Mac OS](#) – Tutorial to install Apache Spark on computer with Mac OS.
- [Setup Java Project with Apache Spark](#) – Apache Spark Tutorial to setup a Java Project in Eclipse with Apache Spark Libraries and get started.
- **Spark Shell** is an interactive shell through which we can access Spark's API. Spark provides the shell in two programming languages : Scala and Python.
 - [Scala Spark Shell](#) – Tutorial to understand the usage of **Scala** Spark Shell with Word Count Example.
 - [Python Spark Shell](#) – Tutorial to understand the usage of **Python** Spark Shell with Word Count Example.
- [Setup Apache Spark to run in Standalone cluster mode](#)
- [Example Spark Application using Python](#) to get started with programming Spark Applications.
- [Configure Apache Spark Ecosystem](#)
 - [Configure Spark Application](#) – Apache Spark Tutorial to learn how to configure a Spark Application like number of Spark Driver Cores, Spark Master, Deployment Mode etc.
 - [Configuring Spark Environment](#)
 - [Configure Logger](#)

Spark RDD

Spark is built on RDD (Resilient Distributed Database). RDD is the framework that provides Spark the ability to do parallel data processing on a cluster. We shall go through following RDD Transformations and Actions.

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Julia Schneider



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Spark: The Definitive Guide Bill Chambers, Matei Zaharia, 2018-02-08 Learn how to use deploy and maintain Apache Spark with this comprehensive guide written by the creators of the open source cluster computing framework With an emphasis on improvements and new features in Spark 2.0 authors Bill Chambers and Matei Zaharia break down Spark topics into distinct sections each with unique goals You'll explore the basic operations and common functions of Spark's structured APIs as well as Structured Streaming a new high level API for building end to end streaming applications Developers and system administrators will learn the fundamentals of monitoring tuning and debugging Spark and explore machine learning techniques and scenarios for employing MLlib Spark's scalable machine learning library Get a gentle overview of big data and Spark Learn about DataFrames SQL and Datasets Spark's core APIs through worked examples Dive into Spark's low level APIs RDDs and execution of SQL and DataFrames Understand how Spark runs on a cluster Debug monitor and tune Spark clusters and applications Learn the power of Structured Streaming Spark's stream processing engine Learn how you can apply MLlib to a variety of problems including classification or recommendation

Spark in Action Petar Zecevic, Marko Bonaci, 2016-11-26 Summary Spark in Action teaches you the theory and skills you need to effectively handle batch and streaming data using Spark Fully updated for Spark 2.0 Purchase of the print book includes a free eBook in PDF Kindle and ePub formats from Manning Publications About the Technology Big data systems distribute datasets across clusters of machines making it a challenge to efficiently query stream and interpret them Spark can help It is a processing system designed specifically for distributed data It provides easy to use interfaces along with the performance you need for production quality analytics and machine learning Spark 2 also adds improved programming APIs better performance and countless other upgrades About the Book Spark in Action teaches you the theory and skills you need to effectively handle batch and streaming data using Spark You'll get comfortable with the Spark CLI as you work through a few introductory examples Then you'll start programming Spark using its core APIs Along the way you'll work with structured data using Spark SQL process near real time streaming data apply machine learning algorithms and munge graph data using Spark GraphX For a zero effort startup you can download the preconfigured virtual machine ready for you to try the book's code

What's Inside Updated for Spark 2.0 Real life case studies Spark DevOps with Docker Examples in Scala and online in Java and Python About the Reader Written for experienced programmers with some background in big data or machine learning About the Authors Petar Zecevic and Marko Bonaci are seasoned developers heavily involved in the Spark community

Table of Contents PART 1 FIRST STEPS Introduction to Apache Spark Spark fundamentals Writing Spark applications The Spark API in depth PART 2 MEET THE SPARK FAMILY Sparkling queries with Spark SQL Ingesting data with Spark Streaming Getting smart with MLlib ML classification and clustering Connecting the dots with GraphX PART 3 SPARK OPS Running Spark Running on a Spark standalone cluster Running on YARN and Mesos PART 4 BRINGING IT TOGETHER Case study real time

dashboard Deep learning on Spark with H2O *Practical Apache Spark* Subhashini Chellappan, Dharanitharan Ganesan, 2018-12-12 Work with Apache Spark using Scala to deploy and set up single node multi node and high availability clusters This book discusses various components of Spark such as Spark Core DataFrames Datasets and SQL Spark Streaming Spark MLlib and R on Spark with the help of practical code snippets for each topic Practical Apache Spark also covers the integration of Apache Spark with Kafka with examples You ll follow a learn to do by yourself approach to learning learn the concepts practice the code snippets in Scala and complete the assignments given to get an overall exposure On completion you ll have knowledge of the functional programming aspects of Scala and hands on expertise in various Spark components You ll also become familiar with machine learning algorithms with real time usage What You Will Learn Discover the functional programming features of Scala Understand the complete architecture of Spark and its components Integrate Apache Spark with Hive and Kafka Use Spark SQL DataFrames and Datasets to process data using traditional SQL queries Work with different machine learning concepts and libraries using Spark s MLlib packages Who This Book Is For Developers and professionals who deal with batch and stream data processing [Frank Kane's Taming Big Data with Apache Spark and Python](#) Frank Kane, 2017-06-30 Frank Kane s hands on Spark training course based on his bestselling Taming Big Data with Apache Spark and Python video now available in a book Understand and analyze large data sets using Spark on a single system or on a cluster About This Book Understand how Spark can be distributed across computing clusters Develop and run Spark jobs efficiently using Python A hands on tutorial by Frank Kane with over 15 real world examples teaching you Big Data processing with Spark Who This Book Is For If you are a data scientist or data analyst who wants to learn Big Data processing using Apache Spark and Python this book is for you If you have some programming experience in Python and want to learn how to process large amounts of data using Apache Spark Frank Kane s Taming Big Data with Apache Spark and Python will also help you What You Will Learn Find out how you can identify Big Data problems as Spark problems Install and run Apache Spark on your computer or on a cluster Analyze large data sets across many CPUs using Spark s Resilient Distributed Datasets Implement machine learning on Spark using the MLlib library Process continuous streams of data in real time using the Spark streaming module Perform complex network analysis using Spark s GraphX library Use Amazon s Elastic MapReduce service to run your Spark jobs on a cluster In Detail Frank Kane s Taming Big Data with Apache Spark and Python is your companion to learning Apache Spark in a hands on manner Frank will start you off by teaching you how to set up Spark on a single system or on a cluster and you ll soon move on to analyzing large data sets using Spark RDD and developing and running effective Spark jobs quickly using Python Apache Spark has emerged as the next big thing in the Big Data domain quickly rising from an ascending technology to an established superstar in just a matter of years Spark allows you to quickly extract actionable insights from large amounts of data on a real time basis making it an essential tool in many modern businesses Frank has packed this book with over 15 interactive fun filled

examples relevant to the real world and he will empower you to understand the Spark ecosystem and implement production grade real time Spark projects with ease

Style and approach Frank Kane's *Taming Big Data with Apache Spark and Python* is a hands on tutorial with over 15 real world examples carefully explained by Frank in a step by step manner The examples vary in complexity and you can move through them at your own pace

Data Analytics with Spark Using Python Jeffrey Aven, 2018-06-18 Solve Data Analytics Problems with Spark PySpark and Related Open Source Tools Spark is at the heart of today's Big Data revolution helping data professionals supercharge efficiency and performance in a wide range of data processing and analytics tasks In this guide Big Data expert Jeffrey Aven covers all you need to know to leverage Spark together with its extensions subprojects and wider ecosystem Aven combines a language agnostic introduction to foundational Spark concepts with extensive programming examples utilizing the popular and intuitive PySpark development environment This guide's focus on Python makes it widely accessible to large audiences of data professionals analysts and developers even those with little Hadoop or Spark experience Aven's broad coverage ranges from basic to advanced Spark programming and Spark SQL to machine learning You'll learn how to efficiently manage all forms of data with Spark streaming structured semi structured and unstructured Throughout concise topic overviews quickly get you up to speed and extensive hands on exercises prepare you to solve real problems Coverage includes Understand Spark's evolving role in the Big Data and Hadoop ecosystems Create Spark clusters using various deployment modes Control and optimize the operation of Spark clusters and applications Master Spark Core RDD API programming techniques Extend accelerate and optimize Spark routines with advanced API platform constructs including shared variables RDD storage and partitioning Efficiently integrate Spark with both SQL and nonrelational data stores Perform stream processing and messaging with Spark Streaming and Apache Kafka Implement predictive modeling with SparkR and Spark MLlib

Spark in Action, Second Edition Jean-Georges Perrin, 2020-06-02 Summary The Spark distributed data processing platform provides an easy to implement tool for ingesting streaming and processing data from any source In *Spark in Action Second Edition* you'll learn to take advantage of Spark's core features and incredible processing speed with applications including real time computation delayed evaluation and machine learning Spark skills are a hot commodity in enterprises worldwide and with Spark's powerful and flexible Java APIs you can reap all the benefits without first learning Scala or Hadoop Foreword by Rob Thomas Purchase of the print book includes a free eBook in PDF Kindle and ePub formats from Manning Publications About the technology Analyzing enterprise data starts by reading filtering and merging files and streams from many sources The Spark data processing engine handles this varied volume like a champ delivering speeds 100 times faster than Hadoop systems Thanks to SQL support an intuitive interface and a straightforward multilanguage API you can use Spark without learning a complex new ecosystem About the book *Spark in Action Second Edition* teaches you to create end to end analytics applications In this entirely new book you'll learn from interesting Java based examples including a complete data pipeline

for processing NASA satellite data And you ll discover Java Python and Scala code samples hosted on GitHub that you can explore and adapt plus appendixes that give you a cheat sheet for installing tools and understanding Spark specific terms What s inside Writing Spark applications in Java Spark application architecture Ingestion through files databases streaming and Elasticsearch Querying distributed datasets with Spark SQL About the reader This book does not assume previous experience with Spark Scala or Hadoop About the author Jean Georges Perrin is an experienced data and software architect He is France s first IBM Champion and has been honored for 12 consecutive years Table of Contents PART 1 THE THEORY CRIPPLED BY AWESOME EXAMPLES 1 So what is Spark anyway 2 Architecture and flow 3 The majestic role of the dataframe 4 Fundamentally lazy 5 Building a simple app for deployment 6 Deploying your simple app PART 2 INGESTION 7 Ingestion from files 8 Ingestion from databases 9 Advanced ingestion finding data sources and building your own 10 Ingestion through structured streaming PART 3 TRANSFORMING YOUR DATA 11 Working with SQL 12 Transforming your data 13 Transforming entire documents 14 Extending transformations with user defined functions 15 Aggregating your data PART 4 GOING FURTHER 16 Cache and checkpoint Enhancing Spark s performances 17 Exporting data and building full data pipelines 18 Exploring deployment

Guide for Databricks® Spark Python (PySpark) CRT020 Certification

Rashmi Shah, Apache Spark is one of the fastest growing technology in BigData computing world It supports multiple programming languages like Java Scala Python and R Hence many existing and new framework started to integrate Spark platform as well in their platform for instance Hadoop Cassandra EMR etc While creating Spark certification material HadoopExam Engineering team found that there is no proper material and book is available for the Spark version 2 x which covers the concepts as well as use of various features and found difficulty in creating the material Therefore they decided to create full length book for Spark Databricks CRT020 Spark Scala Python or PySpark Certification and outcome of that is this book In this book technical team try to cover both fundamental concepts of Spark 2 x topics which are part of the certification syllabus as well as add as many exercises as possible and in current version we have around 46 hands on exercises added which you can execute on the Databricks community edition because each of this exercises tested on that platform as well as this book is focused on the PySpark version of the certification hence all the exercises and their solution provided in the Python This book is divided in 13 chapters as you move ahead chapter by chapter you would be comfortable with the Databricks Spark Python certification CRT020 Same exercises you can convert into different programming language like Java Scala R as well Its more about the syntax

Apache Spark 2 for Beginners Rajanarayanan

Thottuvaikkatamana,2016-09-30 Develop large scale distributed data processing applications using Spark 2 in Scala and PythonAbout This Book This book offers an easy introduction to the Spark framework published on the latest version of Apache Spark 2 Perform efficient data processing machine learning and graph processing using various Spark components A practical guide aimed at beginners to get them up and running with SparkWho This Book Is ForIf you are an application

developer data scientist or big data solutions architect who is interested in combining the data processing power of Spark from R and consolidating data processing stream processing machine learning and graph processing into one unified and highly interoperable framework with a uniform API using Scala or Python this book is for you

What You Will Learn

- Get to know the fundamentals of Spark 2 and the Spark programming model using Scala and Python
- Know how to use Spark SQL and DataFrames using Scala and Python
- Get an introduction to Spark programming using R
- Perform Spark data processing charting and plotting using Python
- Get acquainted with Spark stream processing using Scala and Python
- Be introduced to machine learning using Spark MLlib
- Get started with graph processing using the Spark GraphX
- Bring together all that you've learned and develop a complete Spark application

In Detail

Spark is one of the most widely used large scale data processing engines and runs extremely fast. It is a framework that has tools that are equally useful for application developers as well as data scientists. This book starts with the fundamentals of Spark 2 and covers the core data processing framework and API installation and application development setup. Then the Spark programming model is introduced through real world examples followed by Spark SQL programming with DataFrames. An introduction to SparkR is covered next. Later we cover the charting and plotting features of Python in conjunction with Spark data processing. After that we take a look at Spark's stream processing machine learning and graph processing libraries. The last chapter combines all the skills you learned from the preceding chapters to develop a real world Spark application. By the end of this book you will have all the knowledge you need to develop efficient large scale applications using Apache Spark.

Style and approach

Learn about Spark's infrastructure with this practical tutorial. With the help of real world use cases on the main features of Spark we offer an easy introduction to the framework.

Spark in Action, Second Edition Jean-Georges Perrin, 2020-06-02

Summary

The Spark distributed data processing platform provides an easy to implement tool for ingesting streaming and processing data from any source. In *Spark in Action Second Edition* you'll learn to take advantage of Spark's core features and incredible processing speed with applications including real time computation delayed evaluation and machine learning. Spark skills are a hot commodity in enterprises worldwide and with Spark's powerful and flexible Java APIs you can reap all the benefits without first learning Scala or Hadoop.

Foreword by Rob Thomas

Purchase of the print book includes a free eBook in PDF Kindle and ePub formats from Manning Publications.

About the technology

Analyzing enterprise data starts by reading filtering and merging files and streams from many sources. The Spark data processing engine handles this varied volume like a champ delivering speeds 100 times faster than Hadoop systems. Thanks to SQL support an intuitive interface and a straightforward multilanguage API you can use Spark without learning a complex new ecosystem.

About the book

Spark in Action Second Edition teaches you to create end to end analytics applications. In this entirely new book you'll learn from interesting Java based examples including a complete data pipeline for processing NASA satellite data. And you'll discover Java Python and Scala code samples hosted on GitHub that you can explore and adapt plus appendixes that give you a cheat sheet for installing tools and understanding

Spark specific terms What's inside Writing Spark applications in Java Spark application architecture Ingestion through files databases streaming and Elasticsearch Querying distributed datasets with Spark SQL About the reader This book does not assume previous experience with Spark Scala or Hadoop About the author Jean Georges Perrin is an experienced data and software architect He is France's first IBM Champion and has been honored for 12 consecutive years Table of Contents PART 1 THE THEORY CRIPPLED BY AWESOME EXAMPLES 1 So what is Spark anyway 2 Architecture and flow 3 The majestic role of the dataframe 4 Fundamentally lazy 5 Building a simple app for deployment 6 Deploying your simple app PART 2 INGESTION 7 Ingestion from files 8 Ingestion from databases 9 Advanced ingestion finding data sources and building your own 10 Ingestion through structured streaming PART 3 TRANSFORMING YOUR DATA 11 Working with SQL 12 Transforming your data 13 Transforming entire documents 14 Extending transformations with user defined functions 15 Aggregating your data PART 4 GOING FURTHER 16 Cache and checkpoint Enhancing Spark's performances 17 Exporting data and building full data pipelines 18 Exploring deployment

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