Big Data Engineering In details

From Beginner to Professional

Mostafa Alaa Mohamed
Senior Big Data Engineer
MoustafaAlaa Moustafa Alaa @Moustafa_alaa22
mustafa.alaa.mohamed@gmail.com

[1]Big Data & Analytics Department, Epam Systems

The Definitive Guide to Big Data Engineering Tasks

Table of Contents I

Table of Contents II

Table of Contents III

Table of Contents IV

Table of Contents V

Table of Contents VI

Course Introduction

Learning Objectives

- Understand the data management life-cycle.

Learning Objectives

- Understand the data management life-cycle.
- Illustrate the basics of distributed systems concepts

Learning Objectives

- Understand the data management life-cycle.
- Illustrate the basics of distributed systems concepts
- Be familiar with ETL for (Batch/Steaming) data over distributed systems ex: Hadoop & Spark.

Learning Objectives

- Understand the data management life-cycle.
- Illustrate the basics of distributed systems concepts
- Be familiar with ETL for (Batch/Steaming) data over distributed systems ex: Hadoop & Spark.
- Apply QA and testing for the data pipeline cycle.

Learning Objectives

- Understand the data management life-cycle.
- Illustrate the basics of distributed systems concepts
- Be familiar with ETL for (Batch/Steaming) data over distributed systems ex: Hadoop & Spark.
- Apply QA and testing for the data pipeline cycle.
- Automate the Data life-cycle process End-to-End.

Learning Objectives

- Understand the data management life-cycle.
- Illustrate the basics of distributed systems concepts
- Be familiar with ETL for (Batch/Steaming) data over distributed systems ex: Hadoop & Spark.
- Apply QA and testing for the data pipeline cycle.
- Automate the Data life-cycle process End-to-End.
- Building real-life examples.

Learning Objectives

- Understand the data management life-cycle.
- Illustrate the basics of distributed systems concepts
- Be familiar with ETL for (Batch/Steaming) data over distributed systems ex: Hadoop & Spark.
- Apply QA and testing for the data pipeline cycle.
- Automate the Data life-cycle process End-to-End.
- Building real-life examples.
- Applying machine learning over Big Data.

Learning Objectives

- Understand the data management life-cycle.
- Illustrate the basics of distributed systems concepts
- Be familiar with ETL for (Batch/Steaming) data over distributed systems ex: Hadoop & Spark.
- Apply QA and testing for the data pipeline cycle.
- Automate the Data life-cycle process End-to-End.
- Building real-life examples.
- Applying machine learning over Big Data.
- Understanding of the DevOps tools and functions in data life-cycle.

Getting max benefit from this course

Take the course advantage

- Follow the videos order as described.

Getting max benefit from this course

Take the course advantage

- Follow the videos order as described.
- Read the references for each section (including the implementation of the examples if exists).

Getting max benefit from this course

Take the course advantage

- Follow the videos order as described.
- Read the references for each section (including the implementation of the examples if exists).
- Repeat the lecture code with your own.

Getting max benefit from this course

Take the course advantage

- Follow the videos order as described.
- Read the references for each section (including the implementation of the examples if exists).
- Repeat the lecture code with your own.
- Do the assignments.

Getting max benefit from this course

Take the course advantage

- Follow the videos order as described.
- Read the references for each section (including the implementation of the examples if exists).
- Repeat the lecture code with your own.
- Do the assignments.
- Ask your questions.

Getting max benefit from this course

Take the course advantage

- Follow the videos order as described.
- Read the references for each section (including the implementation of the examples if exists).
- Repeat the lecture code with your own.
- Do the assignments.
- Ask your questions.
- Join the online meeting or discussions.

Getting max benefit from this course

Take the course advantage

- Follow the videos order as described.
- Read the references for each section (including the implementation of the examples if exists).
- Repeat the lecture code with your own.
- Do the assignments.
- Ask your questions.
- Join the online meeting or discussions.

Assignments and Labs

Remark

- Full project code.

Assignments and Labs

Remark

- Full project code.
- Notebooks (Jupyter or Zeppelin).

Assignments and Labs

Remark

- Full project code.
- Notebooks (Jupyter or Zeppelin).
- Read the reference.

Textbooks-1

- Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale 4th Edition by Tom White.

Textbooks-1

- Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale 4th Edition by Tom White.
- Learning Spark by Matei Zaharia, Patrick Wendell, Andy Konwinski, Holden Karau

Textbooks-1

- Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale 4th Edition by Tom White.
- Learning Spark by Matei Zaharia, Patrick Wendell, Andy Konwinski, Holden Karau
- High Performance Spark Best Practices for Scaling and Optimizing Apache Spark By Holden Karau, Rachel Warren.

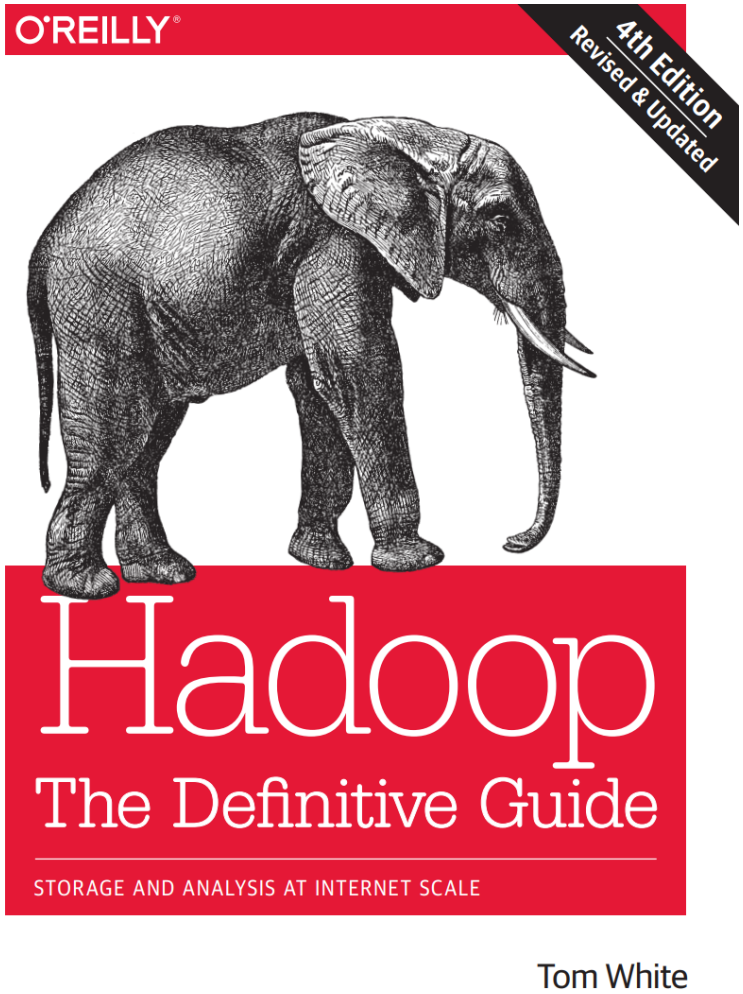
Textbooks-1

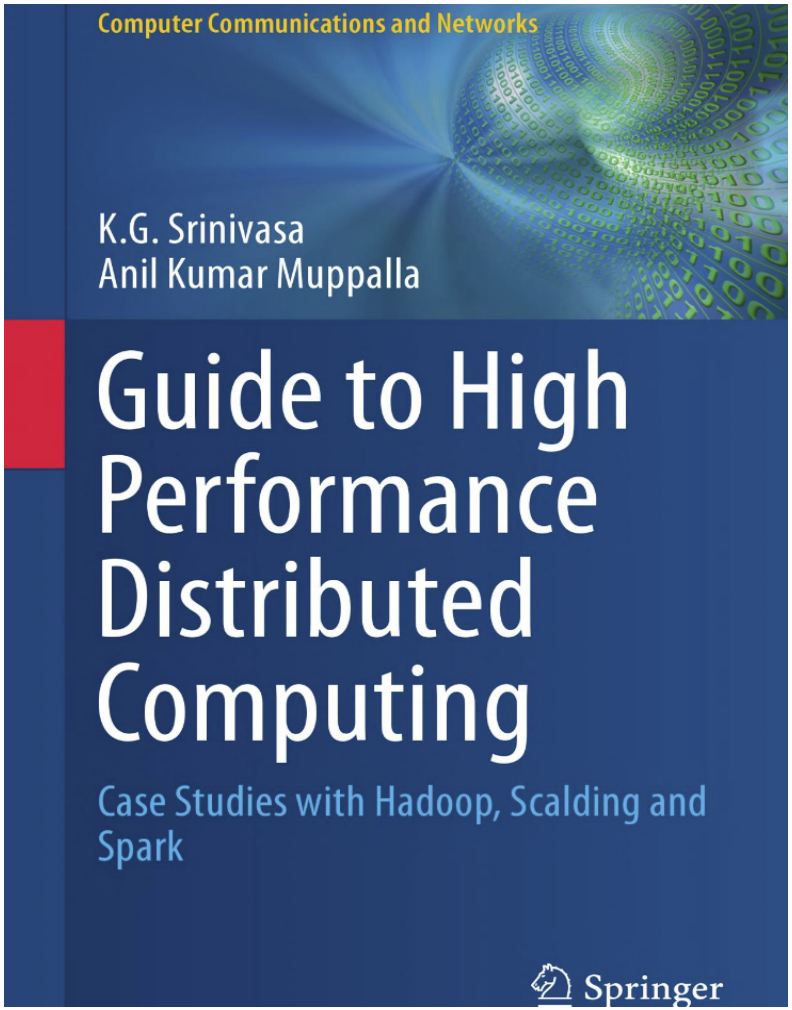
- Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale 4th Edition by Tom White.
- Learning Spark by Matei Zaharia, Patrick Wendell, Andy Konwinski, Holden Karau
- High Performance Spark Best Practices for Scaling and Optimizing Apache Spark By Holden Karau, Rachel Warren.
- Kafka: The Definitive Guide by Todd Palino, Gwen Shapira, Neha Narkhede.

Textbooks-1

- Hadoop: The Definitive Guide: Storage and Analysis at Internet Scale 4th Edition by Tom White.
- Learning Spark by Matei Zaharia, Patrick Wendell, Andy Konwinski, Holden Karau
- High Performance Spark Best Practices for Scaling and Optimizing Apache Spark By Holden Karau, Rachel Warren.
- Kafka: The Definitive Guide by Todd Palino, Gwen Shapira, Neha Narkhede.
- Guide to High Performance Distributed Computing: Case Studies with Hadoop, Scalding and Spark (Computer Communications and Networks) 2015th Edition

Textbooks-2

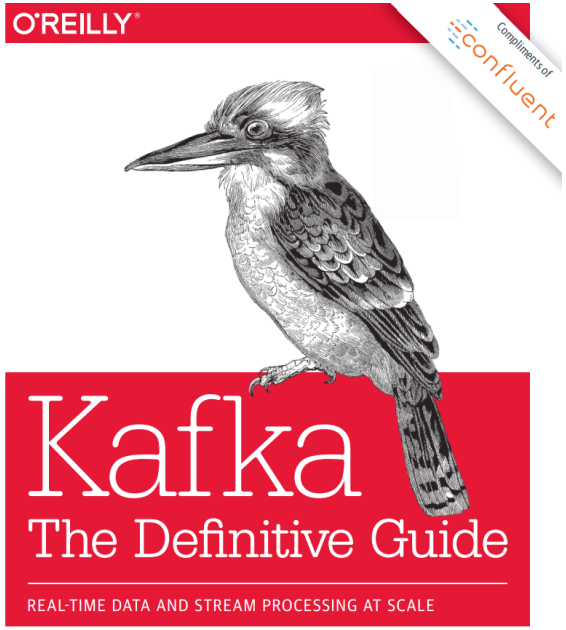

O'REILLY
4th Edition
Revised & Updated
Hadoop
The Definitive Guide
STORAGE AND ANALYSIS AT INTERNET SCALE
Tom White


Computer Communications and Networks
K.G. Srinivasa
Anil Kumar Muppalla
Guide to High Performance Distributed Computing
Case Studies with Hadoop, Scalding and Spark
Springer

Textbooks-3

Holden Karau, Andy Konwinski,
Patrick Wendell & Matei Zaharia

Holden Karau &
Rachel Warren



Neha Narkhede,
Gwen Shapira & Todd Palino

Introduction To Distributed Systems (Hadoop as example)

Chapter Objectives

- What is data management?

Chapter Objectives

- What is data management?
- Introduction to distributed systems concepts

Chapter Objectives

- What is data management?
- Introduction to distributed systems concepts
- Why we need Hadoop?

Chapter Objectives

- What is data management?
- Introduction to distributed systems concepts
- Why we need Hadoop?
- Understand the concept of HDFS and Map-Reduce.

Chapter Objectives

- What is data management?
- Introduction to distributed systems concepts
- Why we need Hadoop?
- Understand the concept of HDFS and Map-Reduce.
- Developing Map-Reduce applications.
- Using Hive QL over Map-Reduce.

Chapter Objectives

- What is data management?
- Introduction to distributed systems concepts
- Why we need Hadoop?
- Understand the concept of HDFS and Map-Reduce.
- Developing Map-Reduce applications.
- Using Hive QL over Map-Reduce.

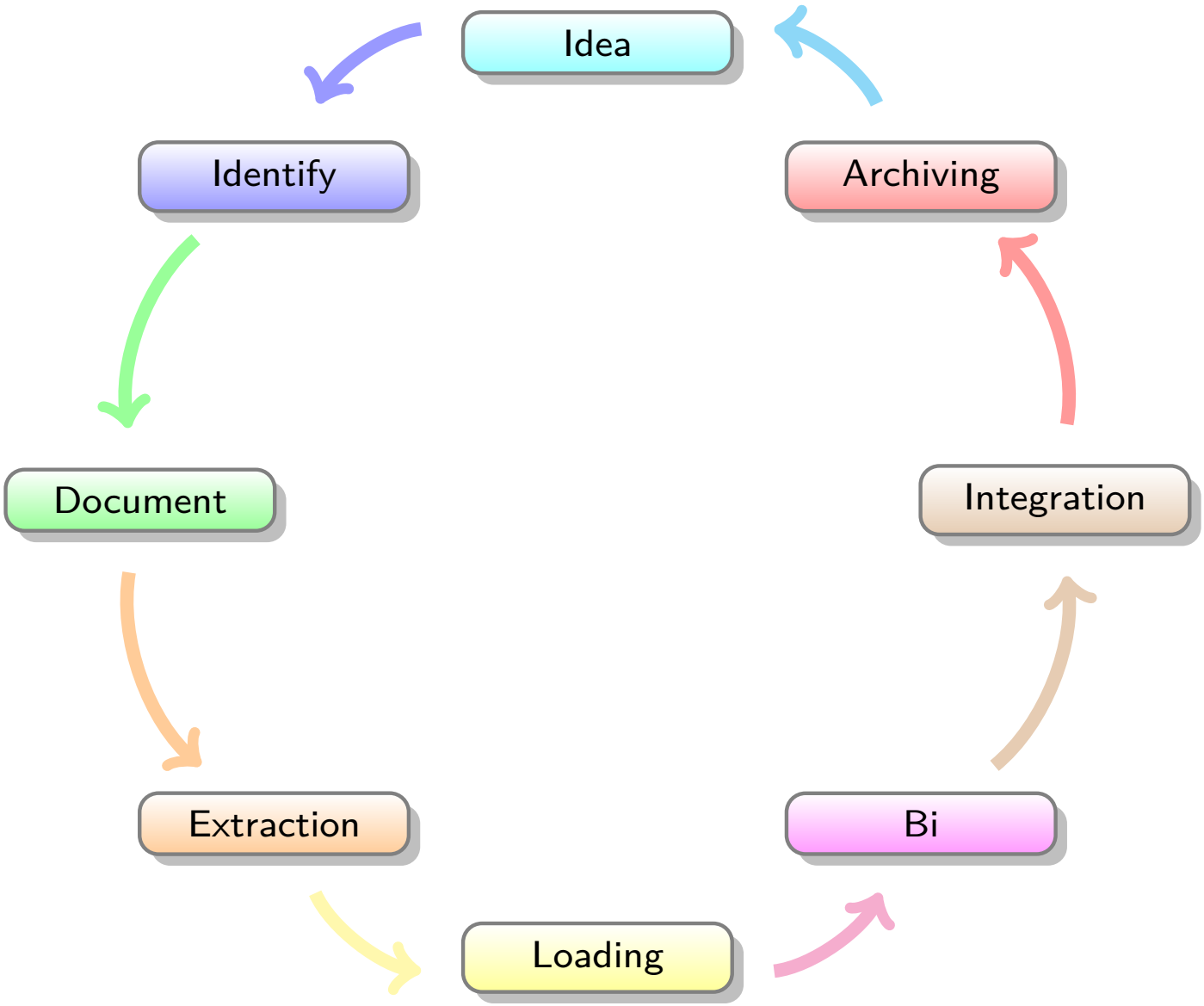
Chapter Objectives

- What is data management?
- Introduction to distributed systems concepts
- Why we need Hadoop?
- Understand the concept of HDFS and Map-Reduce.
- Developing Map-Reduce applications.
- Using Hive QL over Map-Reduce.
- Hadoop advantages and disadvantages with use cases?

Data Management

- Data are a product.
- Data product has a life-cycle as following (simplified):
  - **Question**, Idea, or service.
  - **Identifying** the source of information and the data type ex: (text, images, videos, audio, or sensors).
  - **Document** all details regarding the data including quality, security, efficiency, and access (consideration during the cycle).
  - **Extraction** Process (collection).
  - **Transformation** ex: (cleansing, Apply business logic, Organize).
  - **Loading** or store the transformed data based on our usage or use case.
  - Business Intelligence (**BI**) or data discovery (continues process).
  - **Integration** and publishing.
  - Data retention or **archiving** process ex: (Hot or Cold storage).

Data Management Life-Cycle



From DWH to Big Data

- Any Big Data solution working based distributed systems.

From DWH to Big Data

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Distributed Systems Concepts

- Any Big Data solution working based distributed systems.

Distributed Systems Concepts

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Hadoop Architecture

- Any Big Data solution working based distributed systems.

Hadoop Architecture

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Hadoop Architecture

- Any Big Data solution working based distributed systems.

Hadoop Architecture

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Hadoop Architecture

- Any Big Data solution working based distributed systems.

Hadoop Architecture

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Hadoop Architecture

- Any Big Data solution working based distributed systems.

Hadoop Architecture

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Hadoop Architecture

- Any Big Data solution working based distributed systems.

Hadoop Architecture

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Map-Reduce

- Any Big Data solution working based distributed systems.

Map-Reduce

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Map-Reduce

- Any Big Data solution working based distributed systems.

Map-Reduce

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Map-Reduce

- Any Big Data solution working based distributed systems.

Map-Reduce

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Hive

- Any Big Data solution working based distributed systems.

Hive

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Function Programming

Spark Framework

Spark Framework: Spark Basics

- Any Big Data solution working based distributed systems.

Spark Framework: Spark Basics

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Basics

- Any Big Data solution working based distributed systems.

Spark Basics

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Programming using RDDs

- Any Big Data solution working based distributed systems.

Spark Programming using RDDs

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Programming using RDDs

- Any Big Data solution working based distributed systems.

Spark Programming using RDDs

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Programming using RDDs

- Any Big Data solution working based distributed systems.

Spark Programming using RDDs

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Datasets/Dataframe

- Any Big Data solution working based distributed systems.

Spark Datasets/Dataframe

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Datasets/Dataframe

- Any Big Data solution working based distributed systems.

Spark Datasets/Dataframe

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Datasets/Dataframe

- Any Big Data solution working based distributed systems.

Spark Datasets/Dataframe

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark on Production

- Any Big Data solution working based distributed systems.

Spark on Production

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark on Production

- Any Big Data solution working based distributed systems.

Spark on Production

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark For Batch Processing

- Any Big Data solution working based distributed systems.

Spark For Batch Processing

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Streaming

- Any Big Data solution working based distributed systems.

Spark Streaming

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Streaming

- Any Big Data solution working based distributed systems.

Spark Streaming

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Streaming

- Any Big Data solution working based distributed systems.

Spark Streaming

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Streaming

- Any Big Data solution working based distributed systems.

Spark Streaming

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark using other Programming Languages

- Any Big Data solution working based distributed systems.

Spark using other Programming Languages

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark using other Programming Languages

- Any Big Data solution working based distributed systems.

Spark using other Programming Languages

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark using other Programming Languages

- Any Big Data solution working based distributed systems.

Spark using other Programming Languages

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark For Data Scientist

- Any Big Data solution working based distributed systems.

Spark For Data Scientist

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark For Data Scientist

- Any Big Data solution working based distributed systems.

Spark For Data Scientist

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark For Data Scientist

- Any Big Data solution working based distributed systems.

Spark For Data Scientist

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Graph Dataframe/Graphx

- Any Big Data solution working based distributed systems.

Spark Graph Dataframe/Graphx

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Spark Graph Dataframe/Graphx

- Any Big Data solution working based distributed systems.

Spark Graph Dataframe/Graphx

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Tuning your Spark Jobs

- Any Big Data solution working based distributed systems.

Tuning your Spark Jobs

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Tuning your Spark Jobs

- Any Big Data solution working based distributed systems.

Tuning your Spark Jobs

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Real World Applications

Massaging Systems

Elastic

NOSQL

Data Orchestration

Appendix

Appendix A- Shell Programming

- Any Big Data solution working based distributed systems.

Appendix A- Shell Programming

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Appendix B- Java Programming

- Any Big Data solution working based distributed systems.

Appendix B- Java Programming

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Appendix C- Scala Programming

- Any Big Data solution working based distributed systems.

Appendix C- Scala Programming

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Appendix D- SQL Programming

- Any Big Data solution working based distributed systems.

Appendix D- SQL Programming

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Appendix E- Oozie Orchestration

- Any Big Data solution working based distributed systems.

Appendix E- Oozie Orchestration

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Appendix F- DWH Concepts and Data Modeling Design

- Any Big Data solution working based distributed systems.

Appendix F- DWH Concepts and Data Modeling Design

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Appendix G- Machine Learning Concepts Data Engineers

- Any Big Data solution working based distributed systems.

Appendix G- Machine Learning Concepts Data Engineers

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?

Appendix H- Docker for Data Engineers

- Any Big Data solution working based distributed systems.

Appendix H- Docker for Data Engineers

- Any Big Data solution working based distributed systems.
- What is distributed systems in brief?