Big Data Engineering In details

From Beginner to Professional

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The Definitive Guide to Big Data Engineering Tasks

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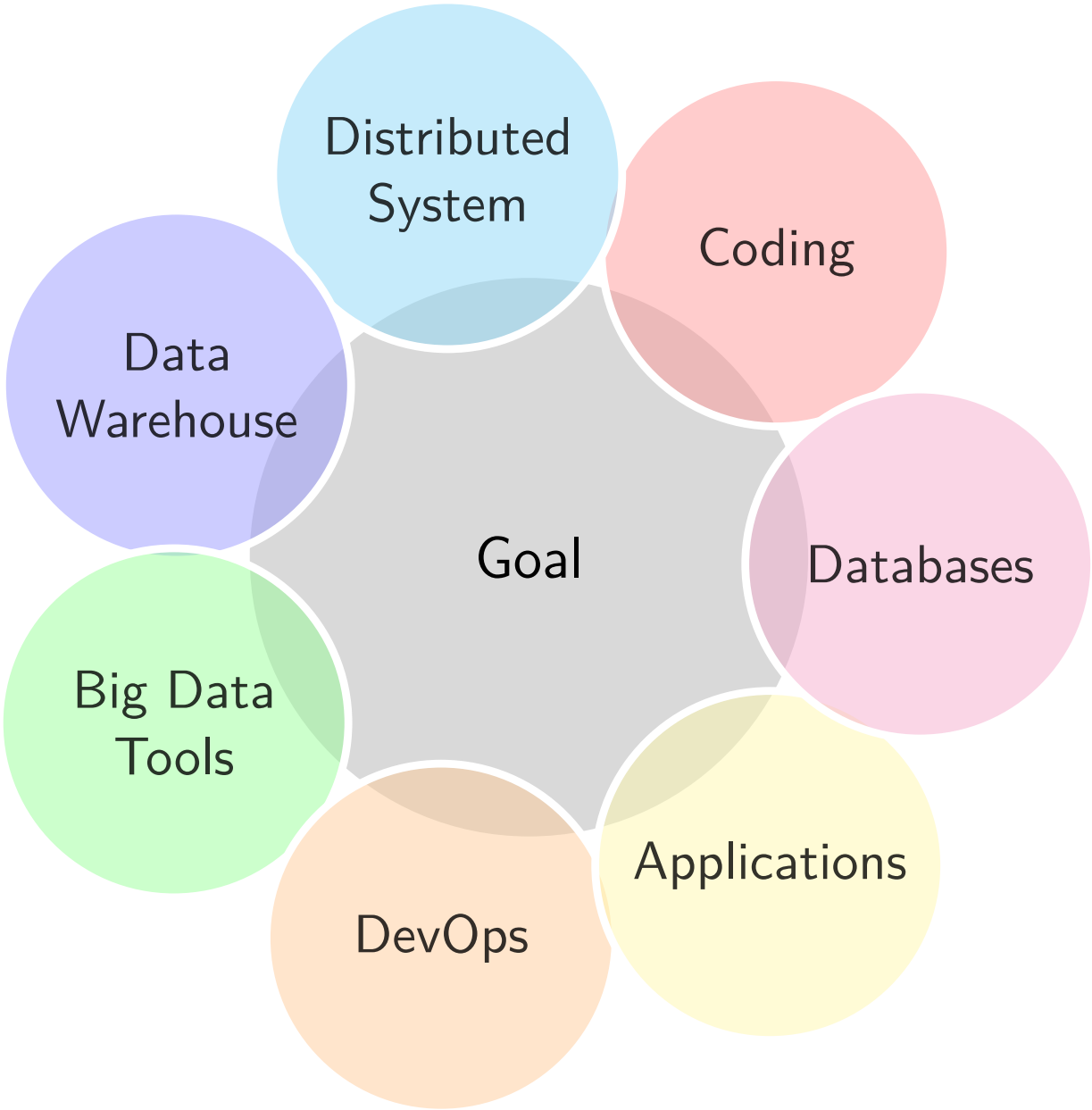
Course Introduction

Course Target



Learning Objectives

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- 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.

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Assignments and Labs

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- Full project code.

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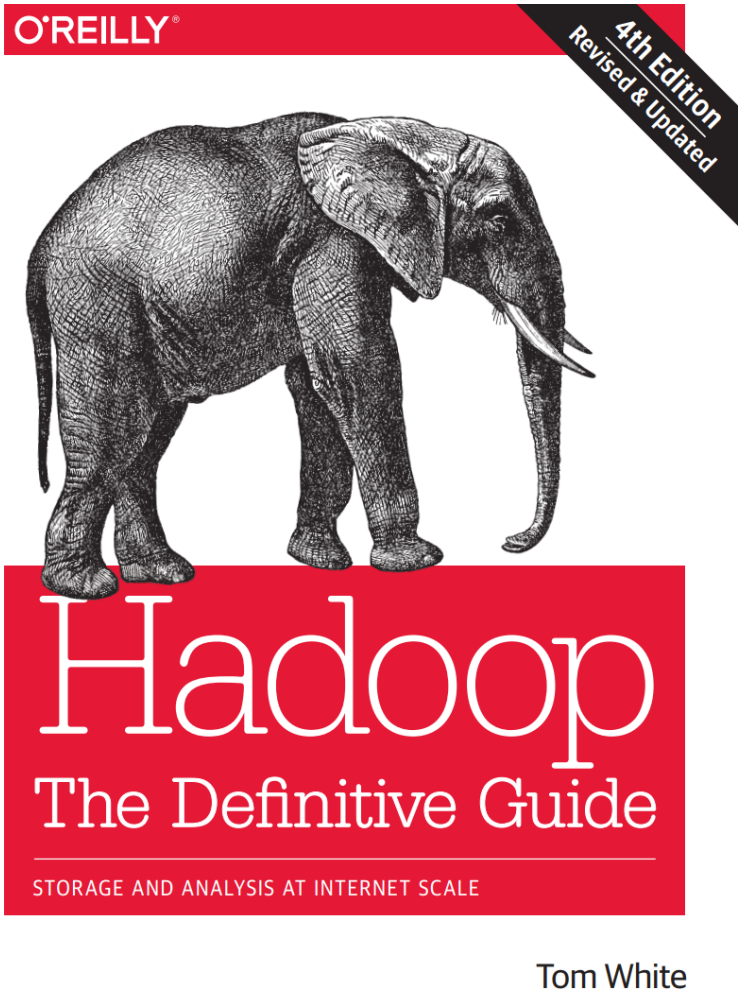
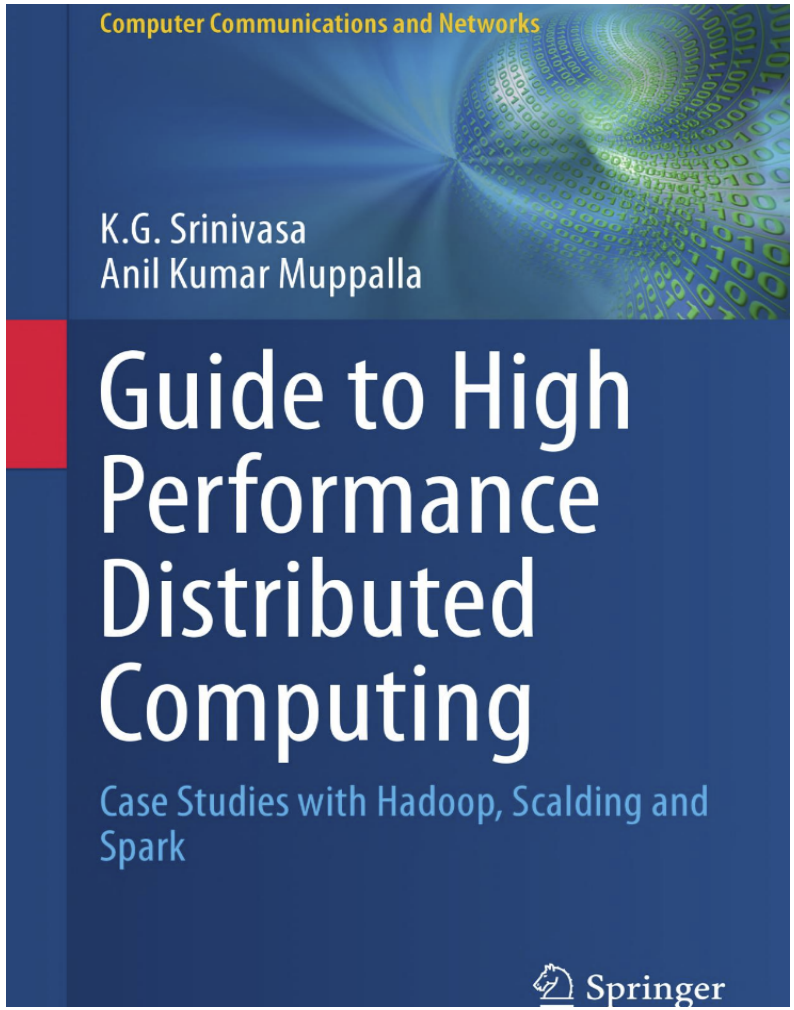
- Kafka: The Definitive Guide by Todd Palino, Gwen Shapira, Neha Narkhede.
- Guide to High Performance Distributed Computing: Case Studies with Hadoop, Scalding and Spark (Computer Communications and Networks) 2015th Edition

Textbooks-2


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


Computer Communications and Networks
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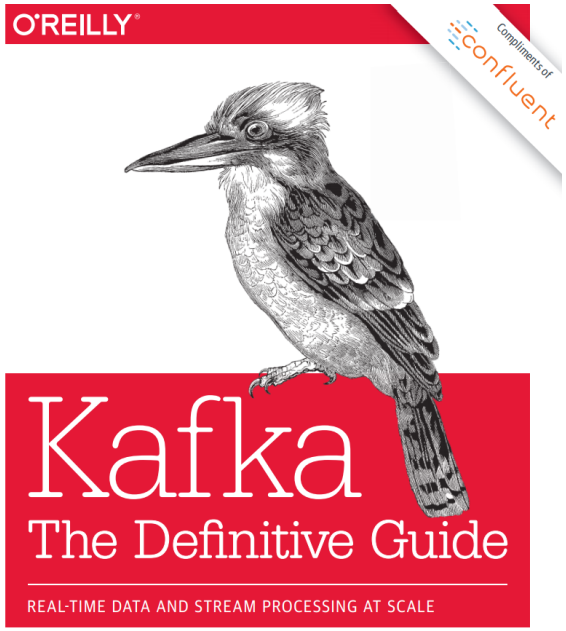

Neha Narkhede,
Gwen Shapira & Todd Palino

Ugly but important

- User stories or technical discussions are not related to any of my current work or my previous companies.
- I am working at EPAM Systems. My company approved me for doing this online course public but the materials are not reviewed or assessed by my company. It is on my own responsibilities.

Introduction To Distributed Systems (Hadoop as as example)

Chapter Objectives

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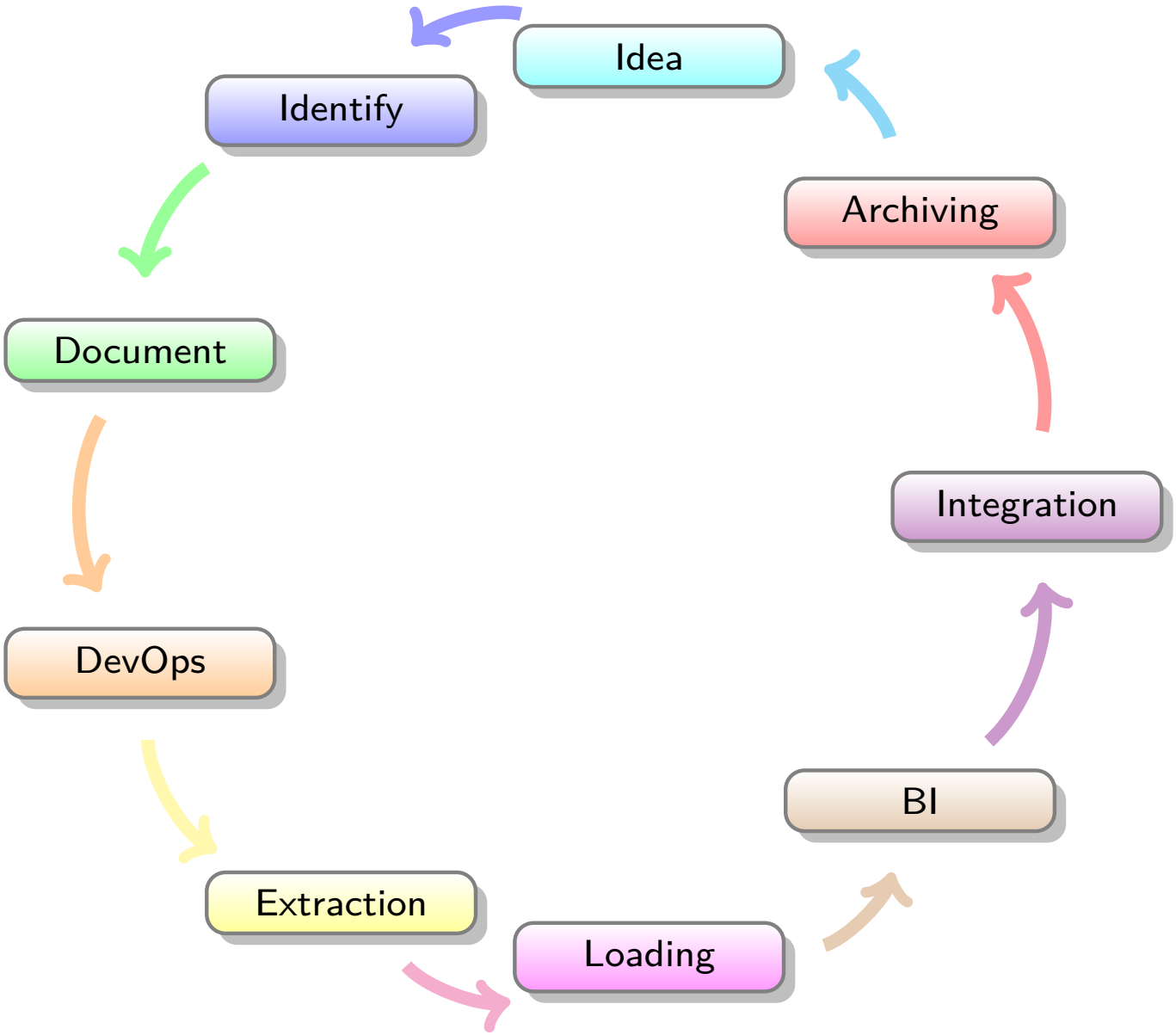
- Hadoop advantages and disadvantages with use cases?

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).
  - Delivery automation (Tools and Process) AKA **DevOps** 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



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  - Performance.
  - Integration.
  - Applying analytical functions.
- Vendors who are working to solve the above challenges creating their own product of DWH and their ultimate work is to optimize the above points.

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- Data warehouse mainly works as centralized storage for all the source systems regardless of the product type or their functionality.
- Data warehouse designed to solve the **huge amount of data**.
- Most of DWH can't solve the online transactions similar to the transaction DB.
- Transactions databases have a performance issue while handling a huge amount of data. So, analysis of a huge amount of data (including historical data) we used DWH for this purpose. On the other hand Transactions DB used for online or short historical data based on product type and requirements.

DWH vs Operational databases

#	Transactions DB	DW
Volume	GB/TB	TB/
Historical	Short-term	Long-
rows	<1000M	1000
Orientation	Product	Subject or m
Business Units	Product team	Multi organiz
Normalization	Normalized	Not required (De-normal
Data Model	Relational	Star Schema
Intelligence	Reporting	Advanced reporting a
Use cases	Online transactions & operations	Centeralized s

Table: Data Representation Combination Matrix

Transnational DB Use cases

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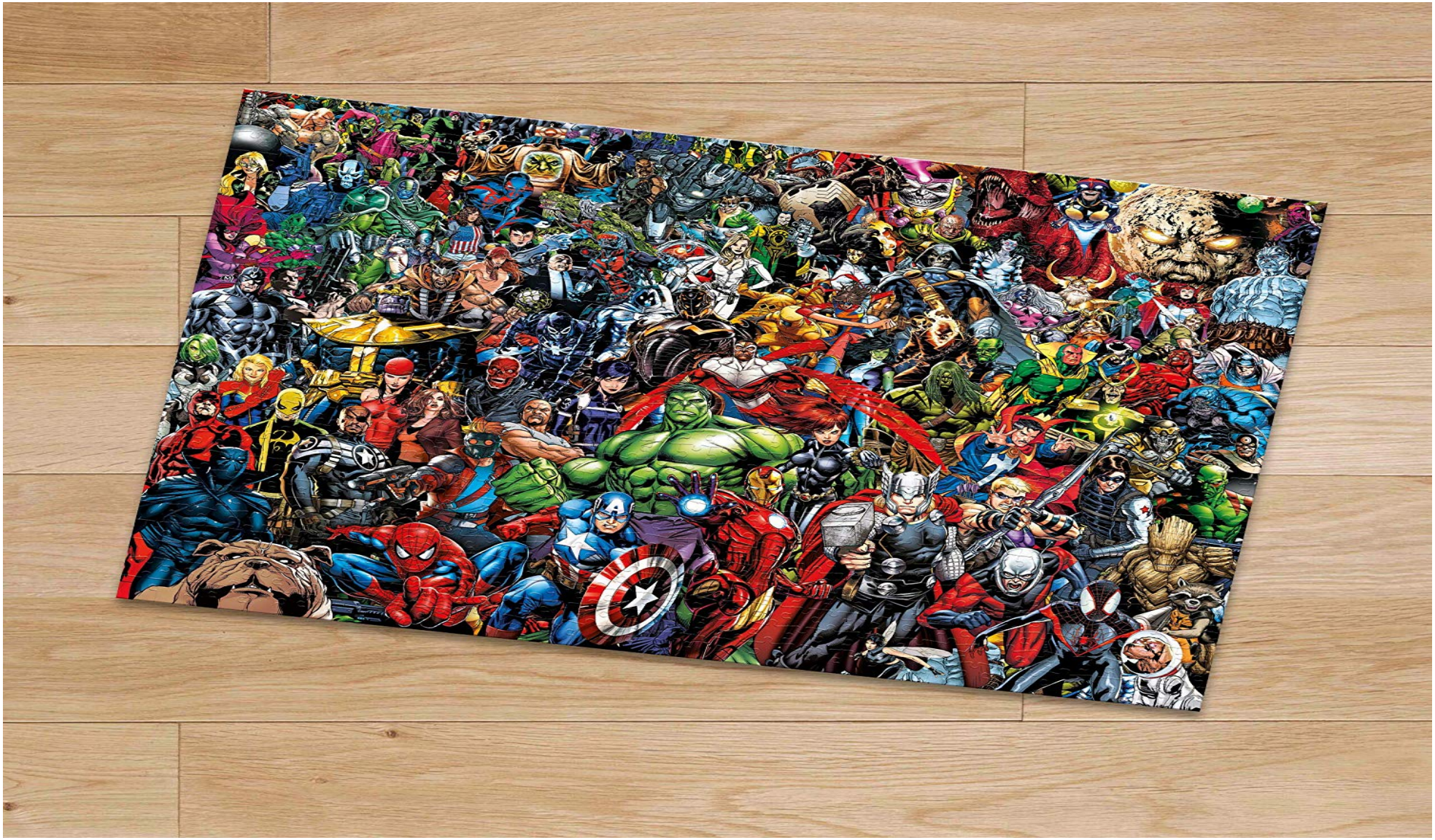
DWH Use cases

DWH Use cases



DWH Use cases

User stories Telecom company.
It has a CRM System backend database reporting the sales. vs Another backend database contains the CRM, Telecom signaling data, IN charging system, Billing
Decision is related to sales or CRM. Decision is related to company strategies.
Analytical model checking the fraud which require a CRM data with customer locations from signaling with Billing details from CAR table.
managing risk of the project in Transaction vs DWH
data model comparison

Cold storage vs Hot storage

some details about hot vs cold storage,

DWH Characteristics

some details about hot vs cold storage,

Distributed Systems Concepts

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Hadoop Architecture

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Storage

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YARN

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Hadoop I/O

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Processing

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Map-Reduce

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Map-Reduce Components

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Word-Count Example

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Hive

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Function Programming

Spark Framework

Spark Framework: Spark Philosophy towards the Engine and the Programming languages

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Real World Applications

Massaging Systems

Elastic

NOSQL

Data Orchestration

Appendix

Appendix A- Shell Programming

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Appendix B- Java Programming

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Appendix C- Scala Programming

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Appendix D- SQL Programming

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Appendix E- Oozie Orchestration

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Appendix F- DWH Concepts and Data Modeling Design

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Appendix G- Machine Learning Concepts Data Engineers

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Appendix H- Docker for Data Engineers

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