(Big) Data Engineering In Depth

Moustafa Mahmoud
Data Solution Architect

Chapter: Apache Spark

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Section: Course References

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Chapter: Introduction to Apache Spark

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Beyond Apache Spark

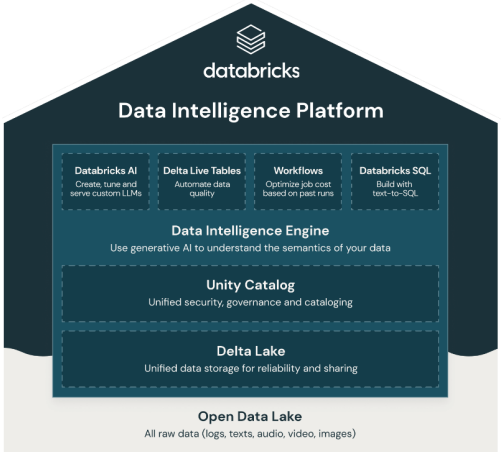

Photo copied from
https://www.datanami.com

Figure F-1: Databricks Analytics Platform

Do You Need Databricks to Work with Spark?

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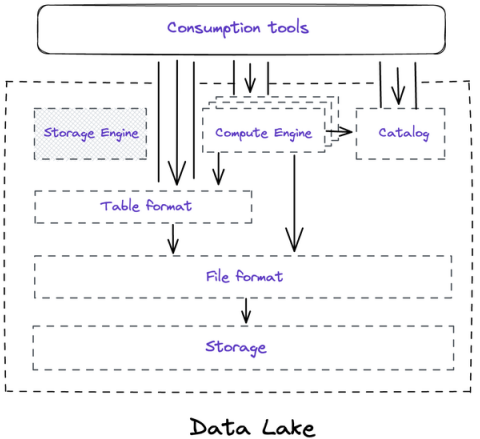
The answer is NO!

Do You Need Databricks to Work with Spark?

- Spark workloads can be run both on the Cloud and on-premise.
  - **Cloud:** Choose any preferred cloud provider, like AWS, GCP, or Azure.
  - **On-Premise:** Deploy on Kubernetes or utilize big data distributions such as Cloudera.
  - **Serverless Platforms:** For efficient resource management, consider options like:
    - **AWS:** EMR Serverless or AWS Glue for auto-scaling and managed services.
    - **GCP:** Dataproc for integrated analytics and machine learning.
    - **Azure:** Azure Synapse for big data and advanced analytics.

Section: Apache Spark in Data Platforms

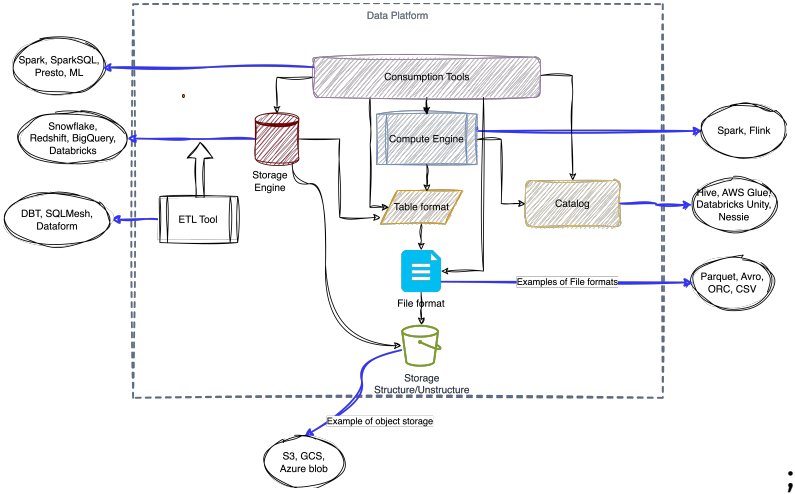
Technical components in a data lake



Apache Iceberg: The Definitive Guide:
Data Lakehouse Functionality,
Performance, and Scalability
on the Data Lake
PUBLISHED BY: O'Reilly Media, Inc.

Figure F-2: Technical components in a data lake

Technical components in a data lake



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Section: Running Spark

Running Spark for Beginners

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- **Install Spark Locally:** For hands-on experience with Spark's core features on your own machine.
- **Spark on Docker:** For a flexible, containerized environment that can replicate a production setup.

Note: For those new to Spark, starting with the Databricks Community Edition is highly recommended due to its user-friendly interface and comprehensive documentation.

Demo!

Section: From MapReduce to Apache Spark

The basic idea of MapReduce

- Assume we need to launch a high-throughput bulk-production sandwich shop.

[1]This example taken from https://reberhardt.com/cs110/summer-2018/lecture-notes/lecture-14/

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The basic idea of MapReduce

- Assume we need to launch a high-throughput bulk-production sandwich shop.
- This sandwich has a lot of raw ingredients, and our target is to produce the sandwich as quickly as possible.
- To make the production very quickly we need to distribute the tasks between the *workers*.

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The basic idea of MapReduce

We break this into three stages

- Map.

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The basic idea of MapReduce

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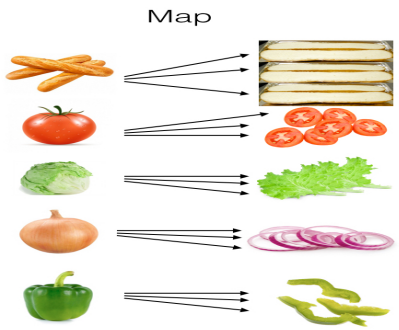
Map

We distribute our raw ingredients amongst the workers.



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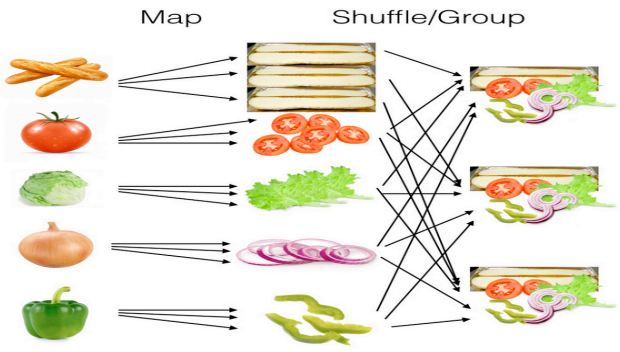
Shuffle/Group

We will organise and group the processed ingredients into piles, so that making a sandwich becomes easy.



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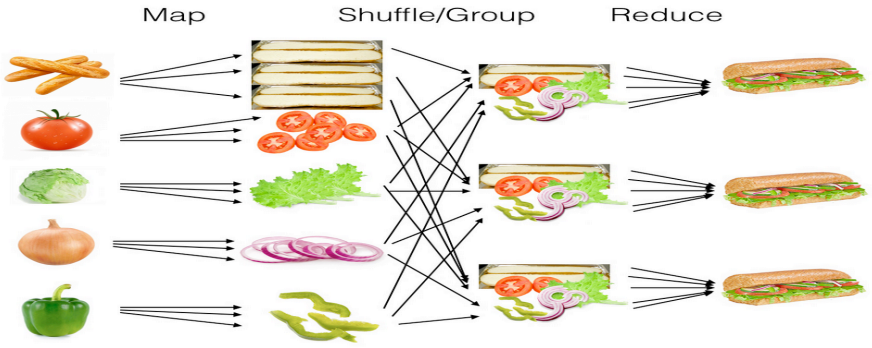
Reduce

we'll combine the ingredients into a sandwich



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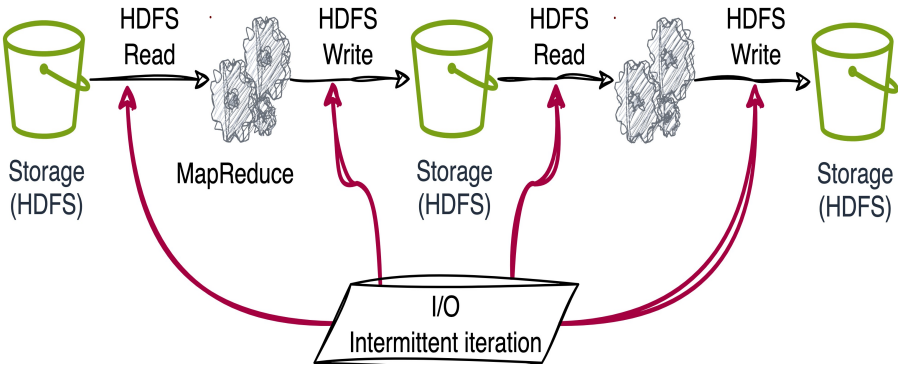
Map Reduce Bottelneck



Spark Motivation

- In-Memory Processing.
- Resilient Distributed Datasets (RDDs).
- Optimized Execution.
- Caching.
- Advanced Optimization.

Section: What is Apache Spark

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Chapter: Apache Spark Distributed Execution

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Section: Further Readings and Assignment

Thank you for watching!

See you in the next video ☺