ADASTRA

Introduction to Data Engineering on Databricks

Adastra Thailand Campus on-tour program

Stamford International University
24 May 2024

Meet our team

Wiparat P.

Head of Operations

Sirakorn L.

Practice Lead – AWS, Data Engineering, and Development

Thanyaporn S.

Recruitment Manager

Manassaphorn W.

HR Manager

Adastra's Global Presence

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BULGARIA
Sofia
Varna
Plovdiv

GREECE
Thessaloniki

THAILAND
Bangkok
Chiang Mai

Countries where we have delivered projects

8
Countries

22
Offices

500+
Customers

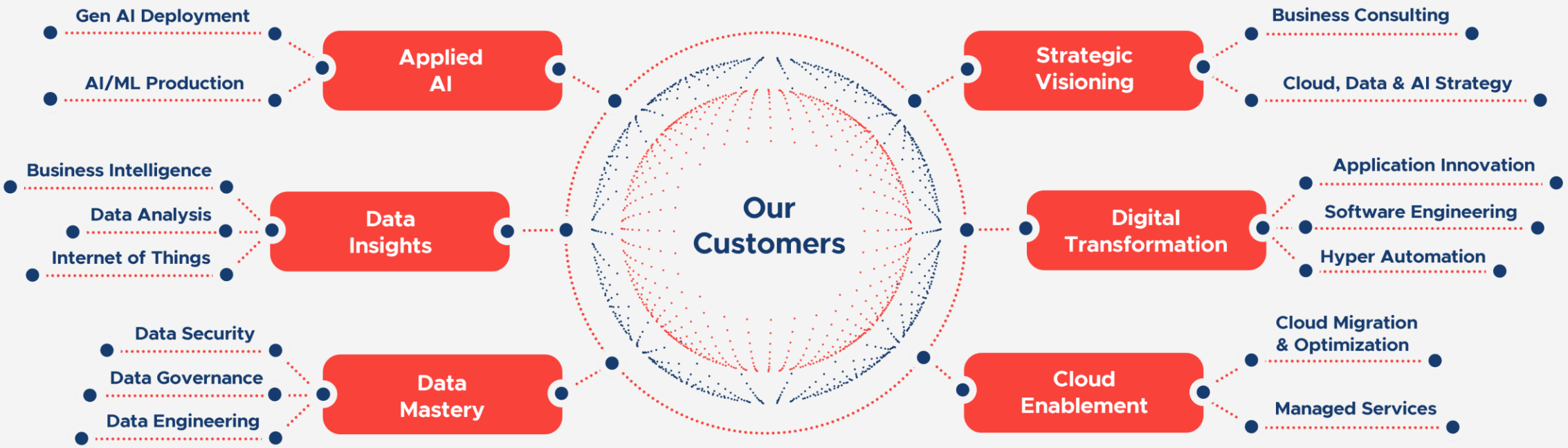
2,200+
Professionals

40+
Countries where we have delivered projects

20+
Languages supported

Realize Your Data-Driven Destiny

For 20+ years, customers have trusted Adastra to design and deliver comprehensive data-driven solutions that fuel efficiency, innovation and long-term success. Our diverse set of Superpowers transform the way organizations utilize their data, unlocking its full potential.



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Google Cloud

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Informatica

AUTOMATION ANYWHERE

snowflake

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CLOUDERA

Attachtap

IBM

SAP

Before we start

- Sign up for Databricks Community Edition at community.cloud.databricks.com
- Grab the copy of this slide with this short URL: https://bit.ly/ath-2024-stiu
- Or with the following QR code:

Sound check!

Ever heard of these terms?

Database

SQL

Data Lake

Data Warehouse

Business Intelligence

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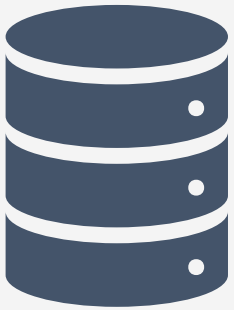
Data and Data Engineering

Big Data: how can it be massive?

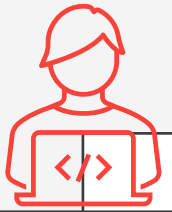




- Cheaper device makes it possible to generate massive data.
- Cheaper storage unit makes it possible to store data first without thinking whether to use it or not.
- Internet makes it capable for users to distribute massive amounts of data.
- How can we process them?
- What are the aspects of processing them?
  - Make predictions and forecasts
  - Deliver insights in understandable format
  - Productionize the process

Data Careers

Data Scientists

- Use statistics, machine learning, mathematics to make predictions and forecasts



Data Engineers

- Build data systems that allow data scientists and data analysts to perform their work

Data Analysts/BI Developer

- Deliver data in an understandable format to help make business decisions

Data Engineering

- Get Data to where it’s needed
- Get data into a usable condition
- Manage data
- Productionize the process

ADASTRA

Data Platforms

Database

- For data collection
- Silo-ed for specific departments or function
- Mostly transactional
- Fast retrieval, fast updates
- **Online Transactional Processing (OLTP)**

How can we make the most of these data?

Data Warehouse

- Central repository for processed and managed historical data
- Ideally not silo-ed
- Designed and Structured for large scale analytical purpose
- Prioritize complex queries and analysis over speedy updates
- Allow answering of specific questions
- **Online Analytical Processing (OLAP)**

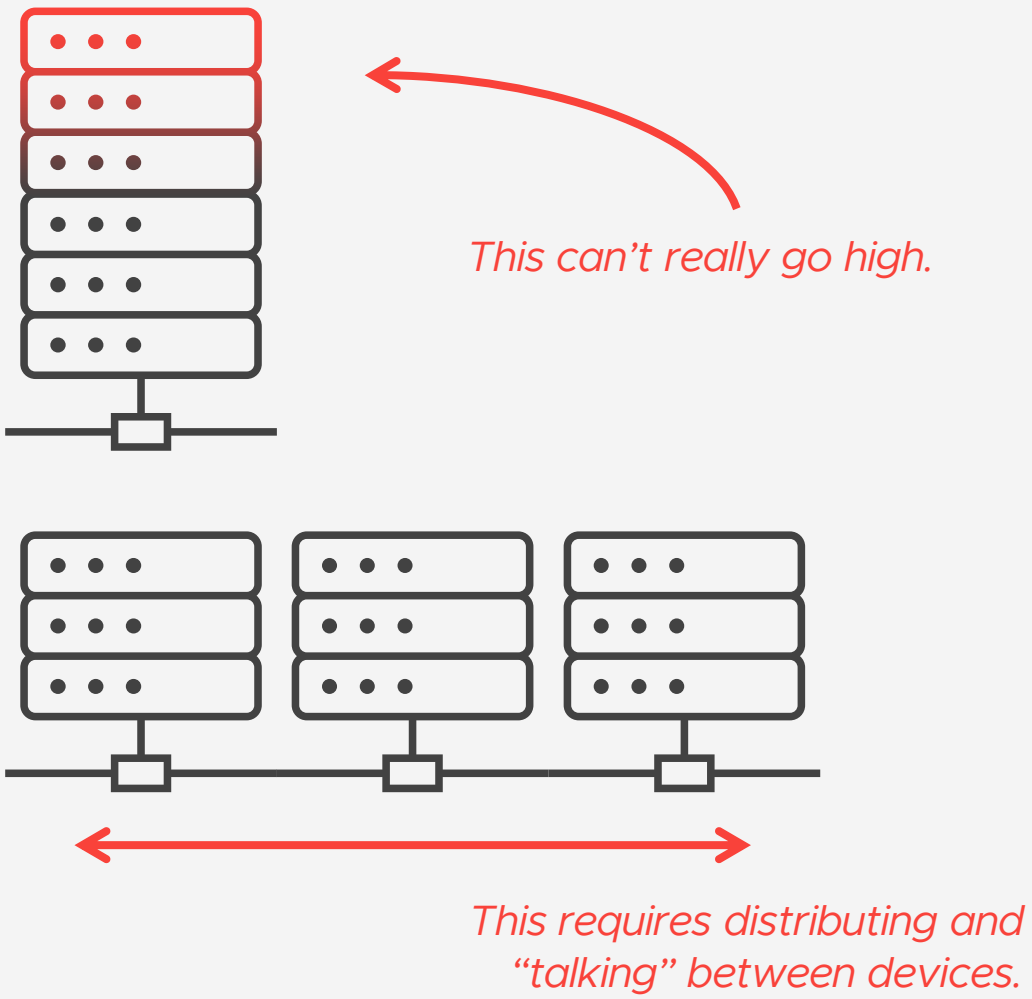
How can we store even more types of data?

Data Lake

- Giant Reservoir of data in any forms, including unprocessed format and unstructured data.
- Can be literally anything from Excel files to images
- Flexibility for exploration
- Focus on volume over usability

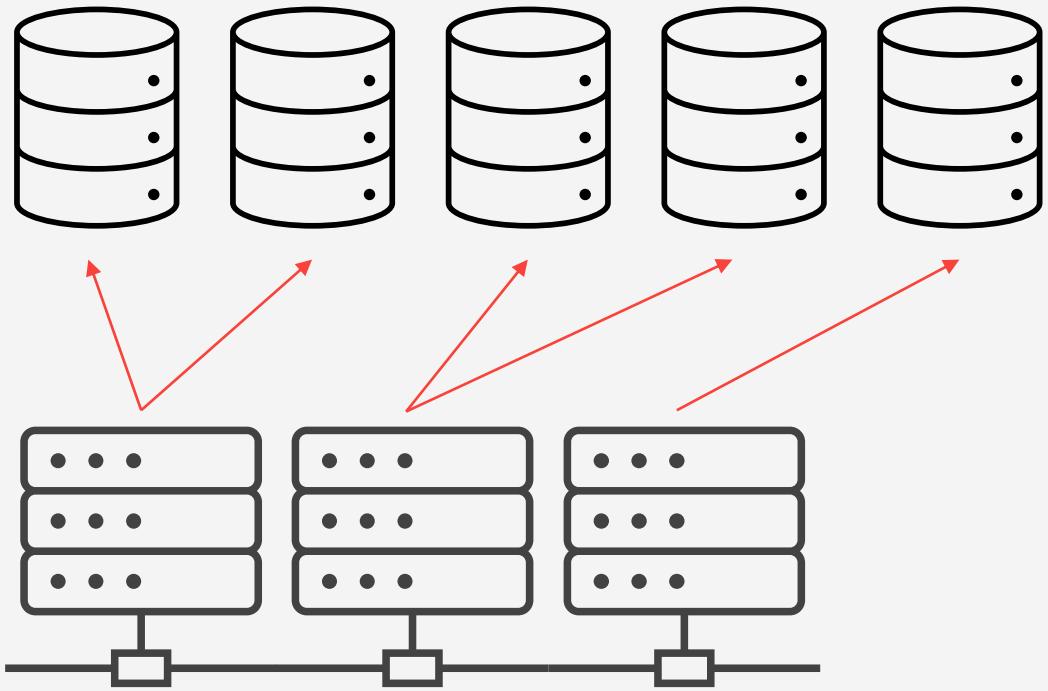
Computation Scaling

- We can scale up our system by adding more resources to a single computational unit.
    - Exists limitations such as bottlenecks.
- We can scale out our system by connecting many smaller systems, therefore creating a distributed system.
    - Achieved Distributed Computing



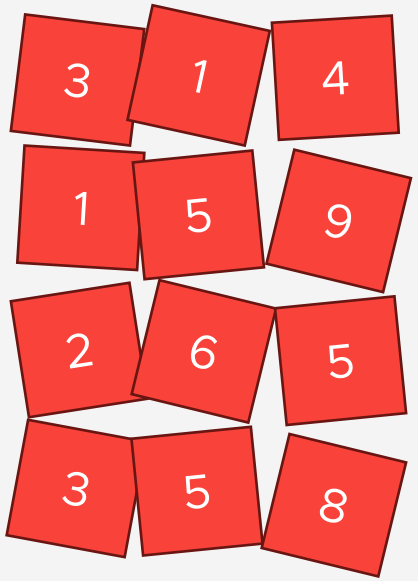
Storage-Compute Decoupling

- Storage and compute demand does not scale proportionally!
- We eventually managed to decouple them and create a flexible solution.
- Still, some analytics workload are harder than others.



Distributed Computing!

Calculate summation of these numbers



Storage

Workers, here is the plan: grab four each, sum them up, and let me know...

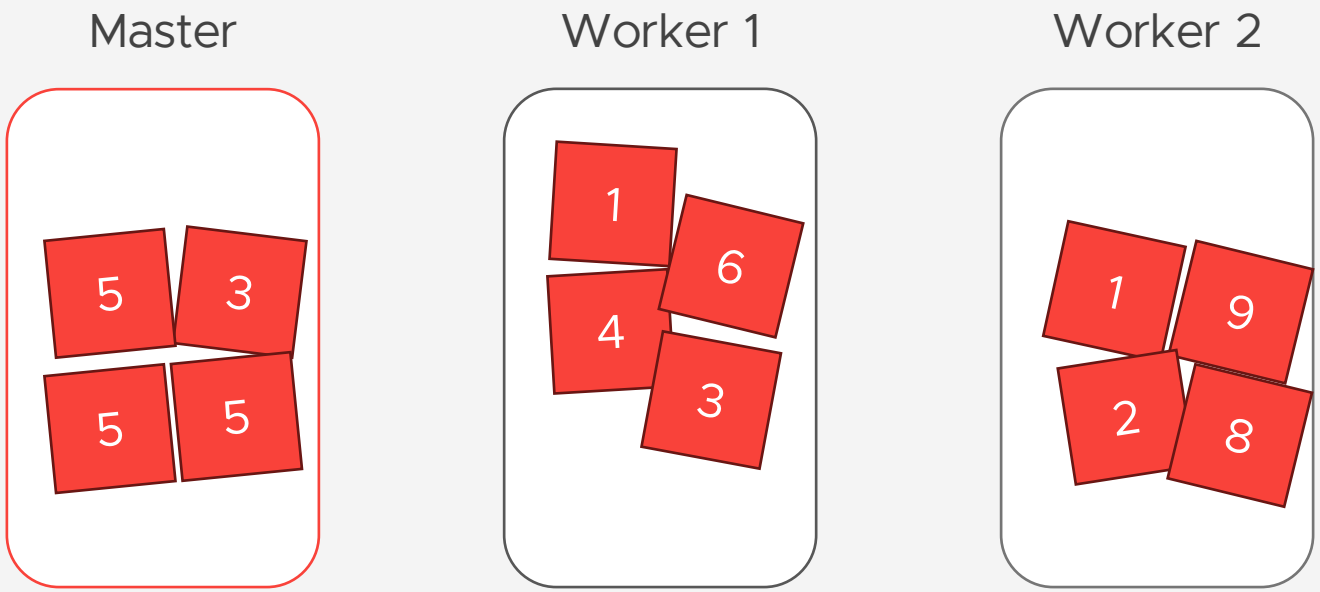
Master

Worker 1

Worker 2

Compute

Distributed Computing!



Storage

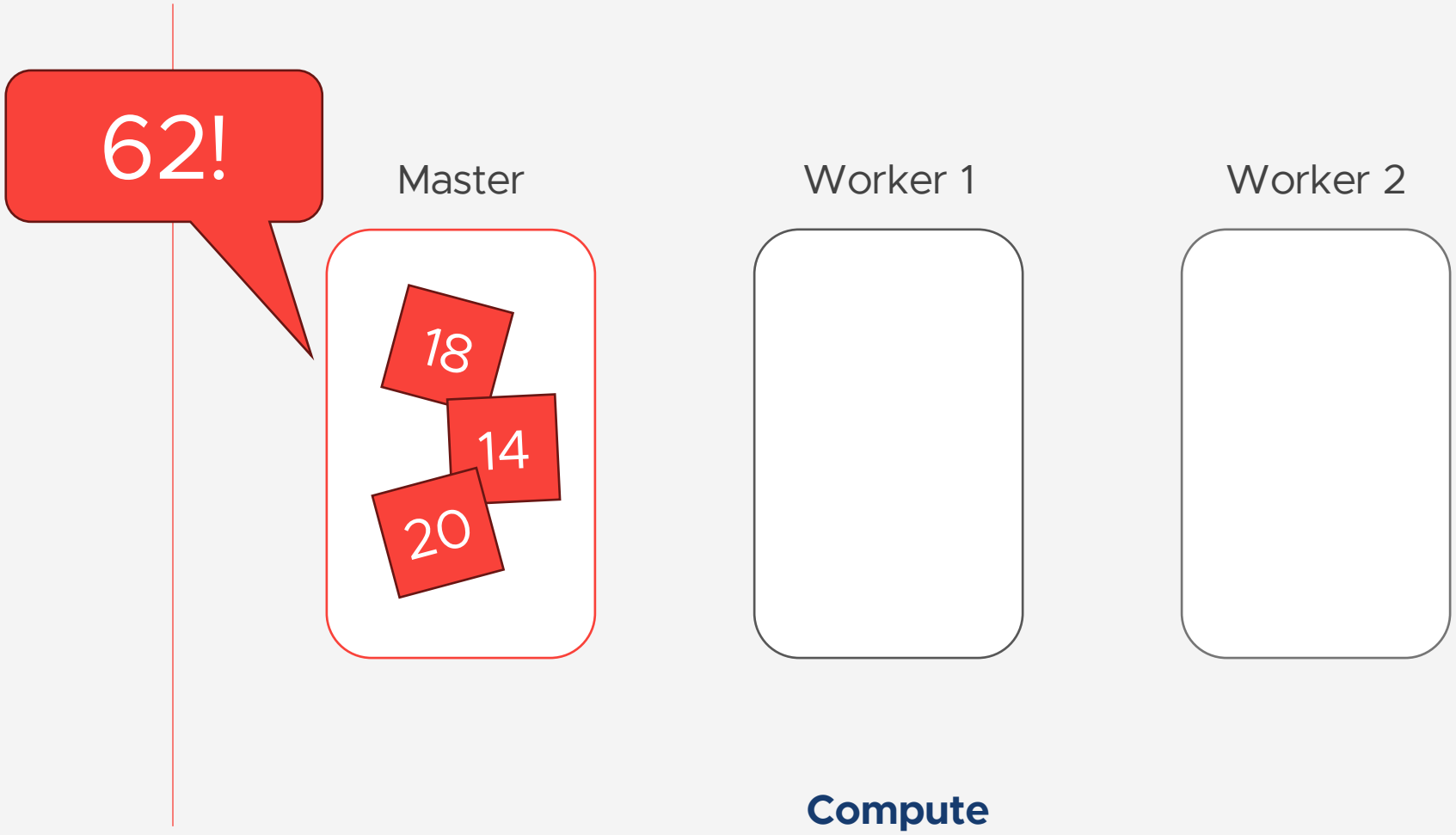
Compute

Distributed Computing!

Storage

Compute

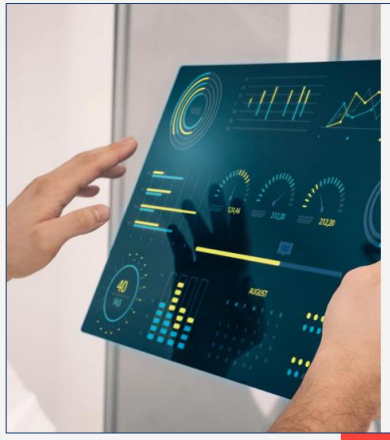
Distributed Computing!



** That is an exclamation mark, not a factorial sign.*

Data Lake House

- Flexibility of Data Lake + Rigidness of transformed data ready to answer business questions of Data Warehouse
- Storage in Lake
- Compute unit somewhere else
- Write results back to Lake
- Query from Lake!



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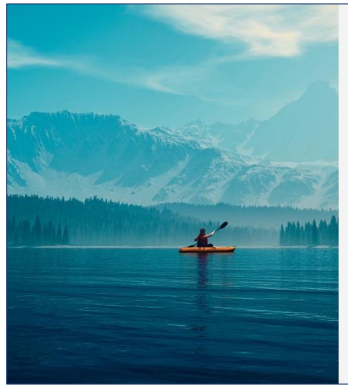

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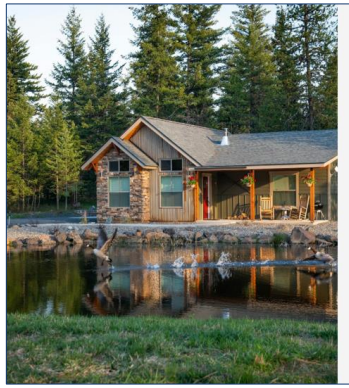

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Medallion Layers of Data Lake House

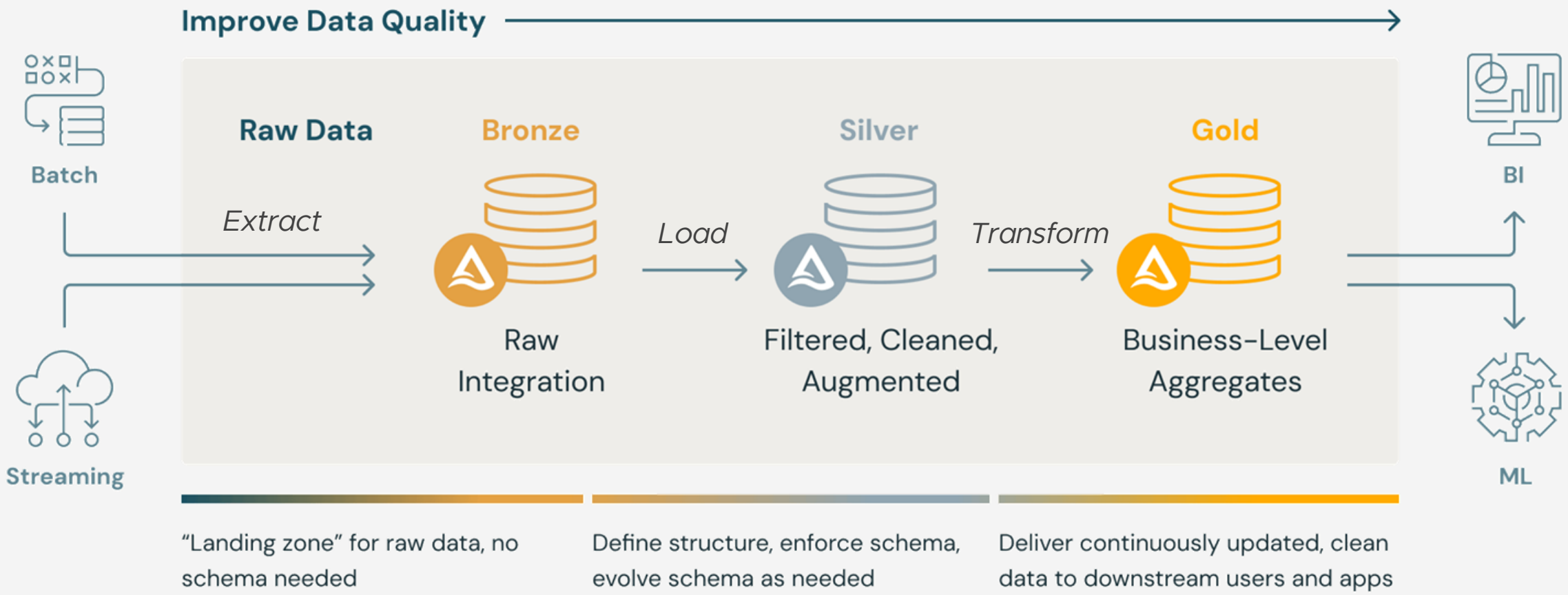
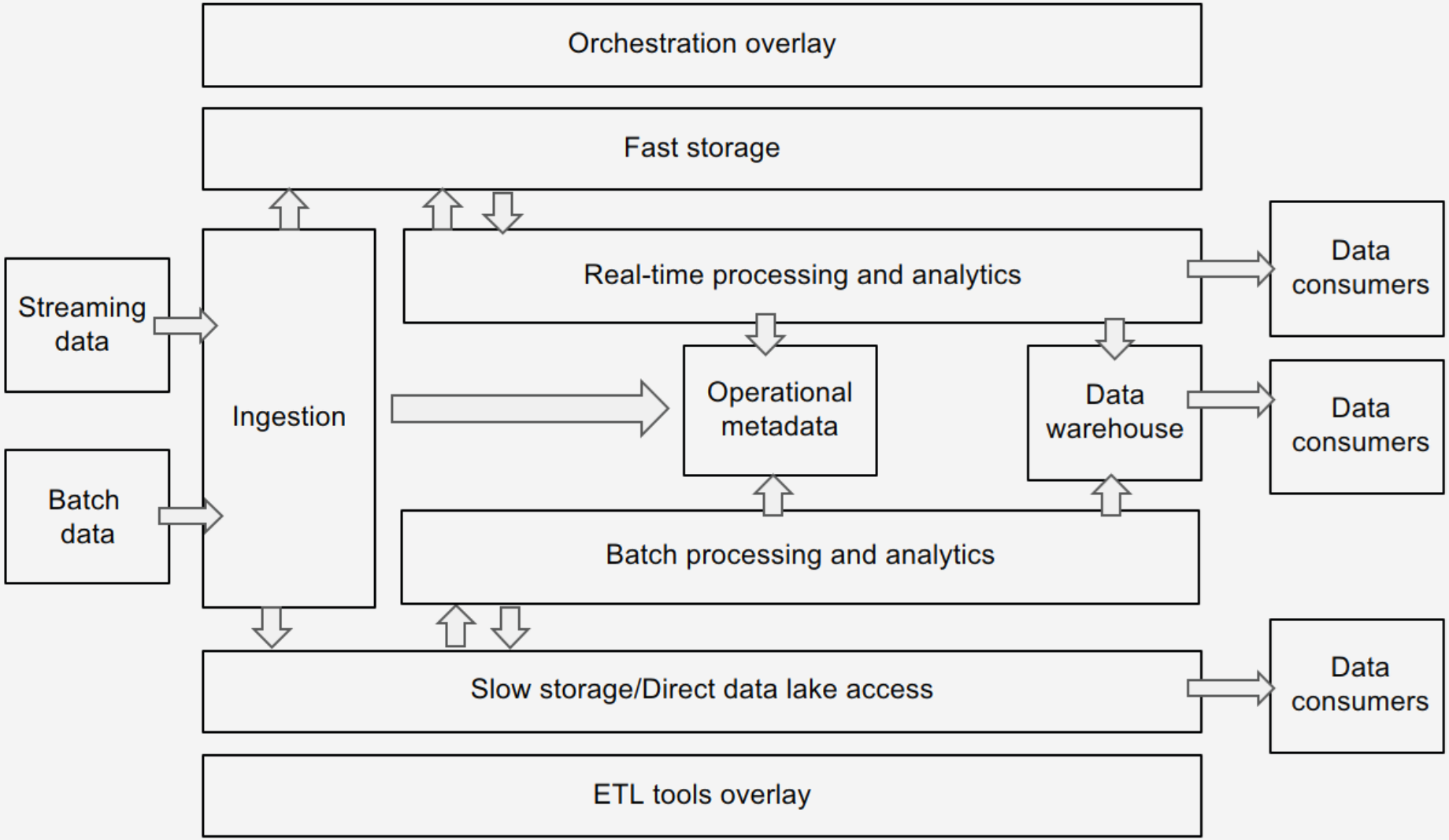


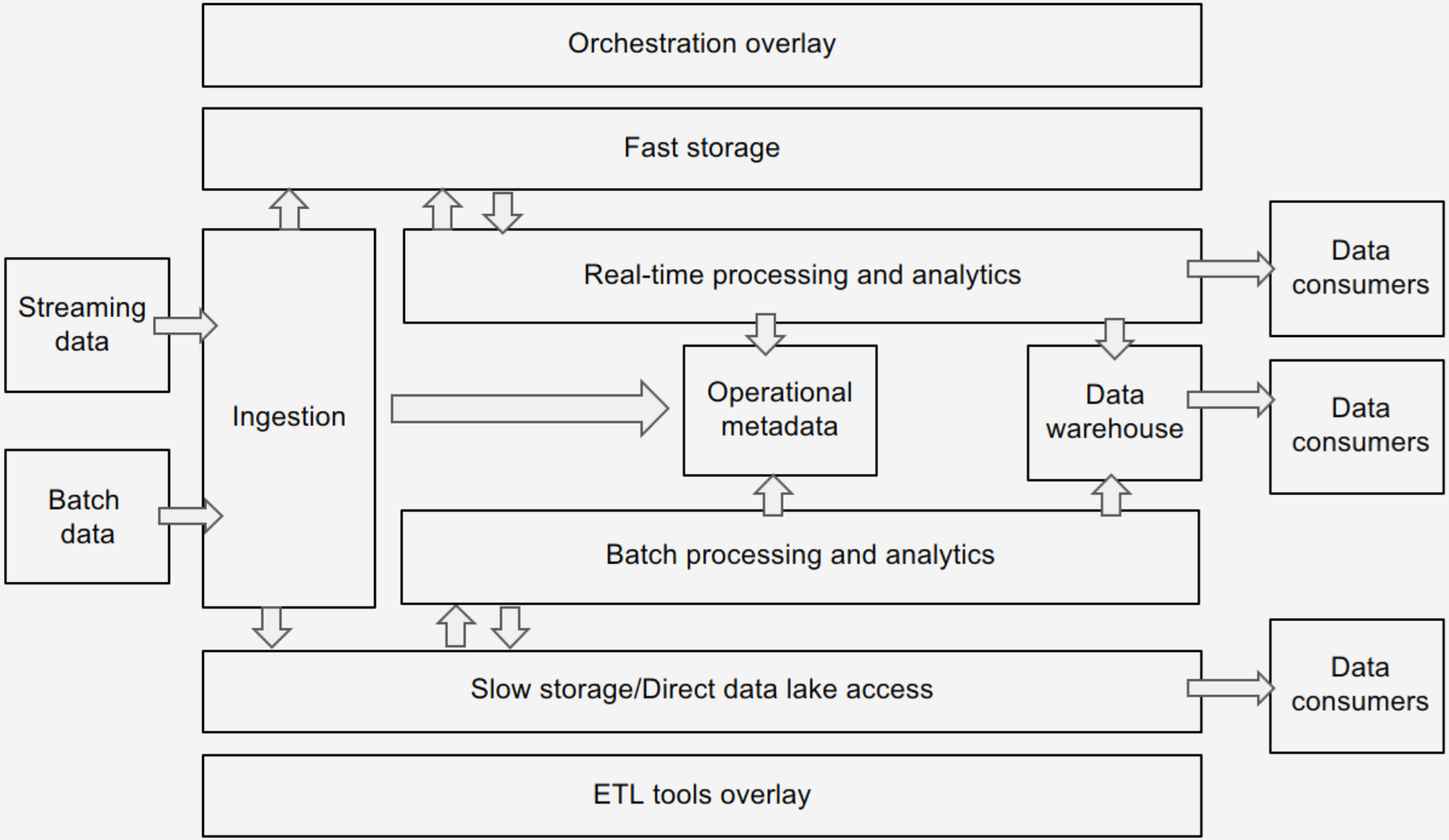
Image courtesy: Databricks

Components of Data Pipelines



D. Zburivsky and L. Partner, *Designing Cloud Data Platforms*. Shelter Island, NY: Manning Publications Co., 2021.

Components of Data Pipelines (continued 1)



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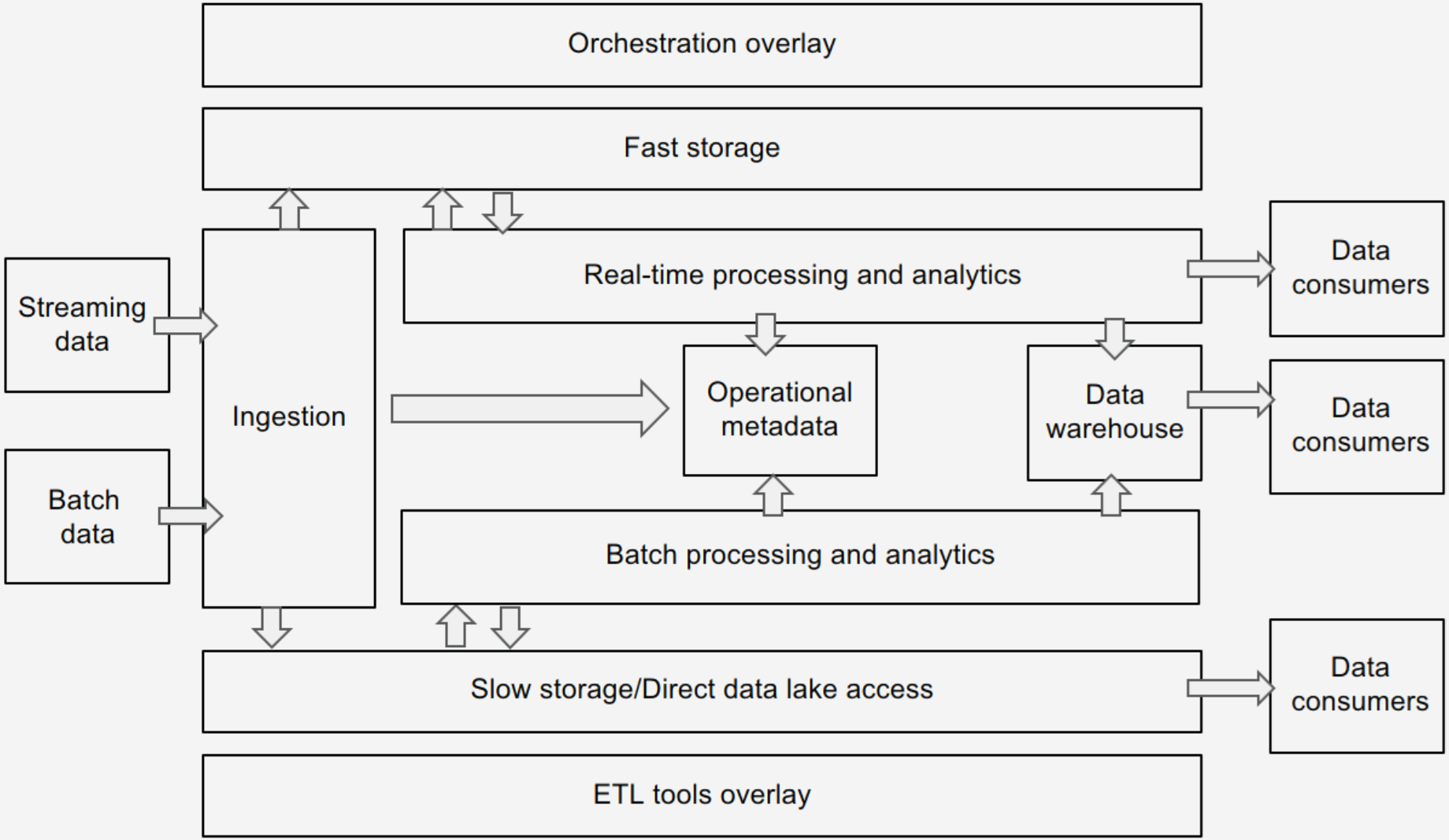
Components of Data Pipelines (continued 2)



D. Zburivsky and L. Partner, *Designing Cloud Data Platforms*. Shelter Island, NY: Manning Publications Co., 2021.

Massive computation
= Massive computers needed


Cloud Data Platforms
Meaning: someone else's computer

Computation Scaling

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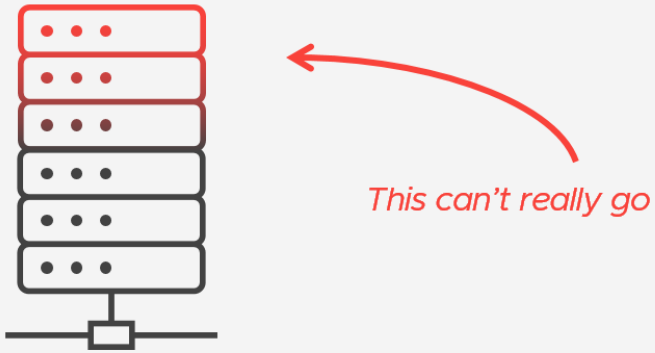
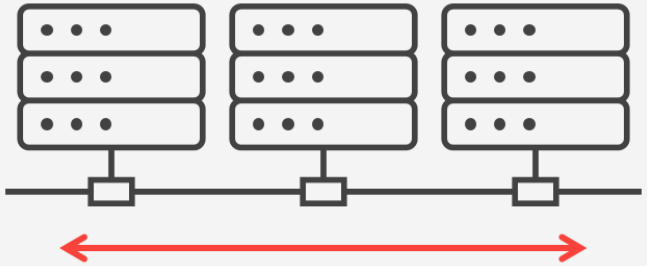


This can't really go high.



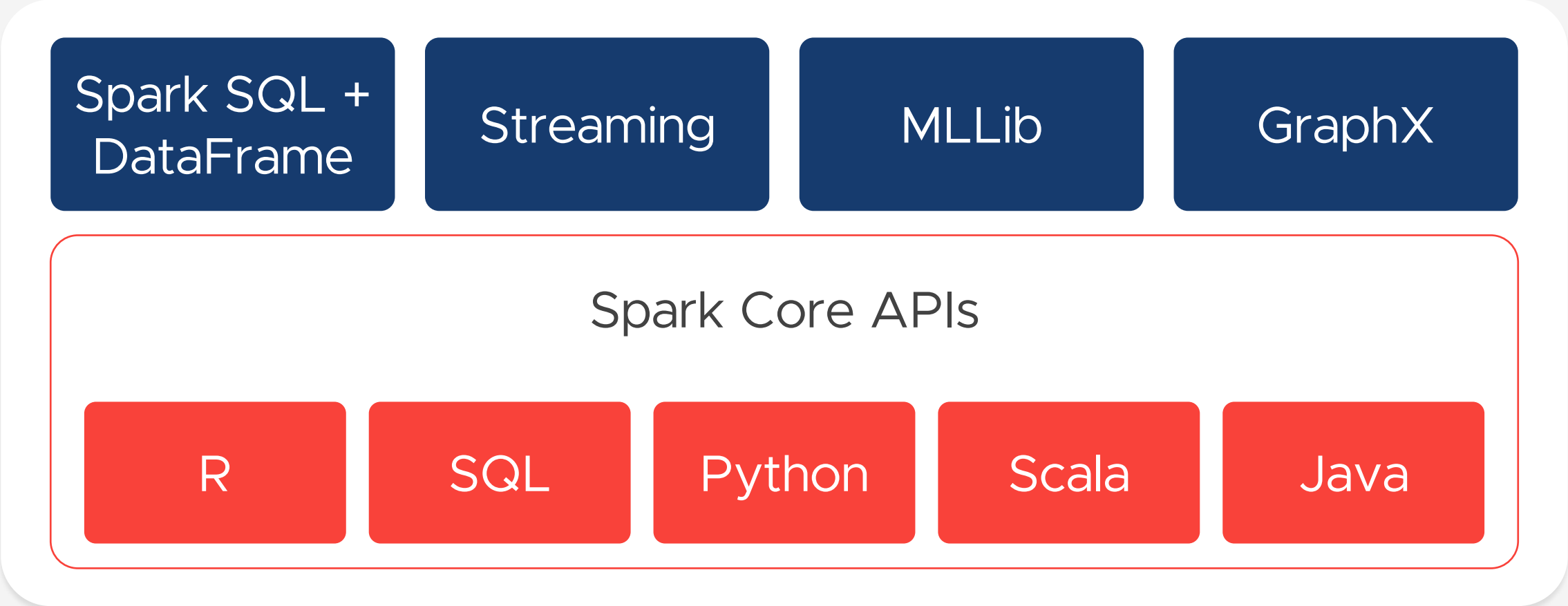
This requires distributing and "talking" between devices.

Don't reinvent this

Apache Spark

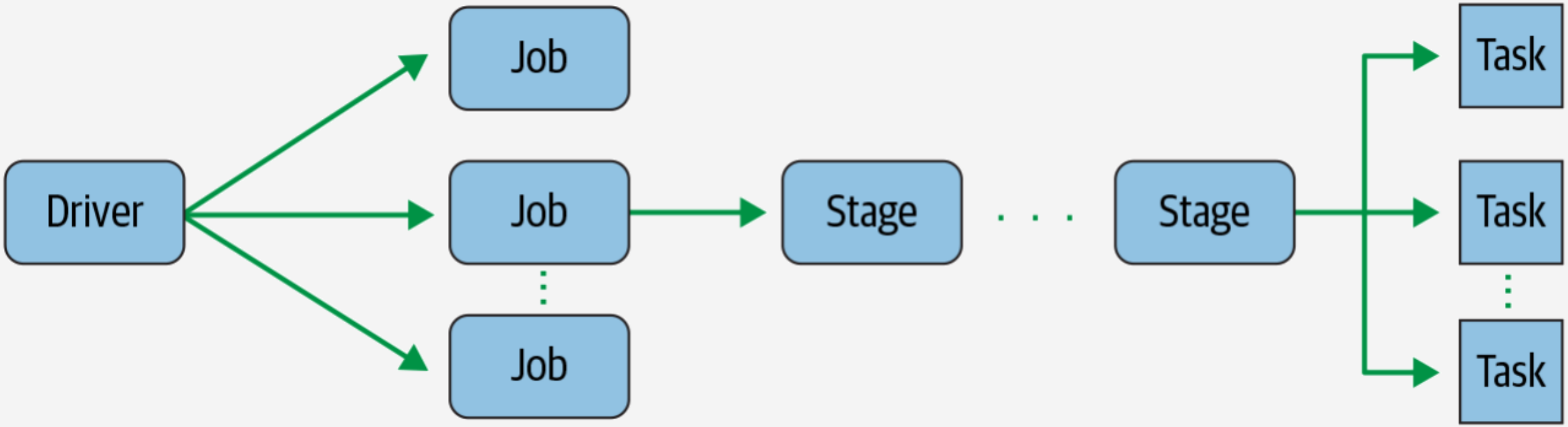
- Open-source unified analytics engine built for large-scale data processing.
- Single machine or across clusters of computers.
- Speed + ease of use -> popularity
- Java/Scala/Python

Spark Core



Adapted from Damji, J., Lee, D., Wenig, B., & Das, T. (2020). *Learning Spark, 2nd Edition*. California: O'Reilly Media, Inc., 2020

Spark Execution



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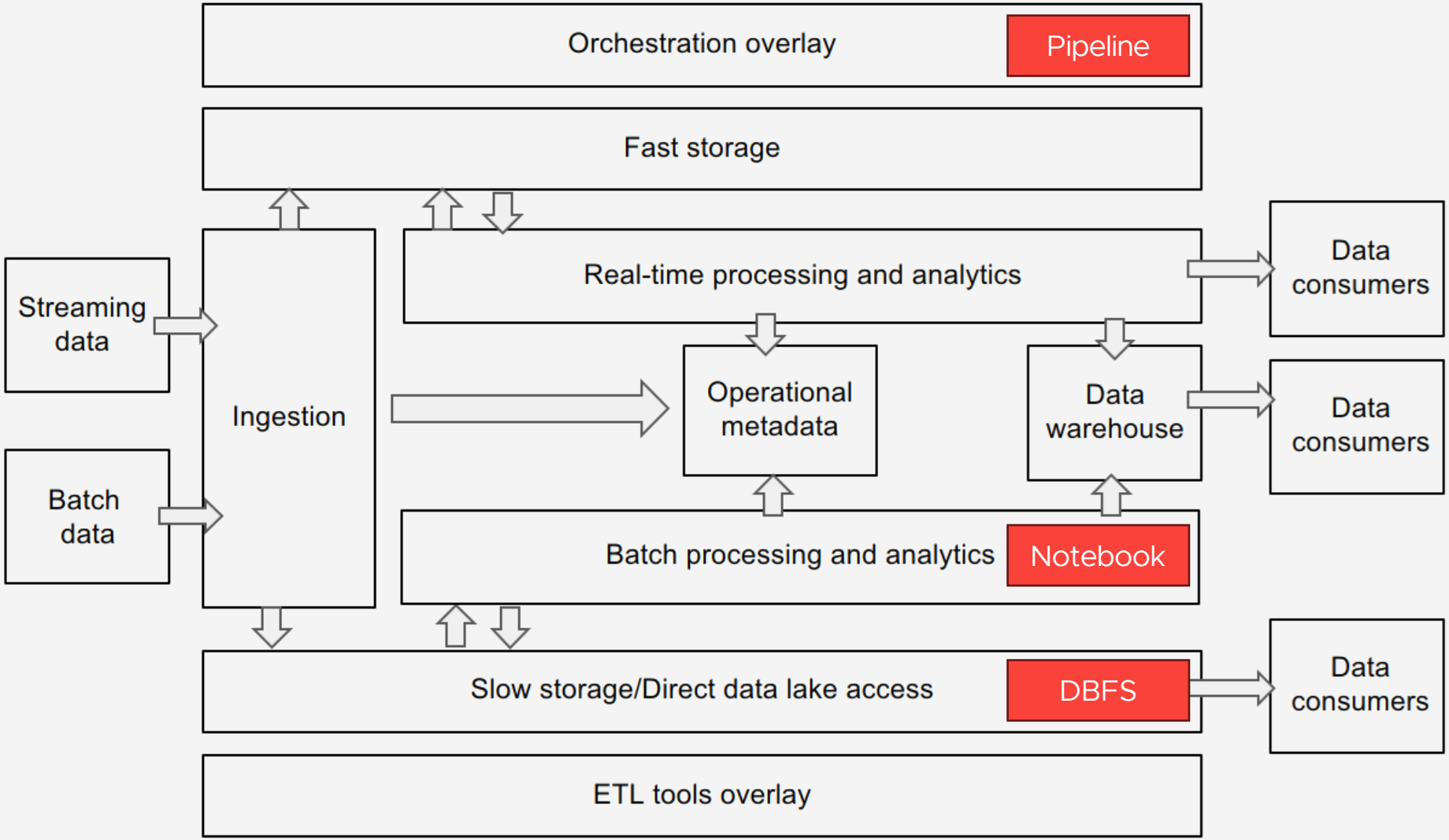
Databricks

- Spark on the cloud
- Less hassle managing Spark cluster
- Provides useful features rather than computing engine
    - GUI for development
    - Data catalog
    - Orchestration*

** non-free plan only*

Data Pipelines on Databricks



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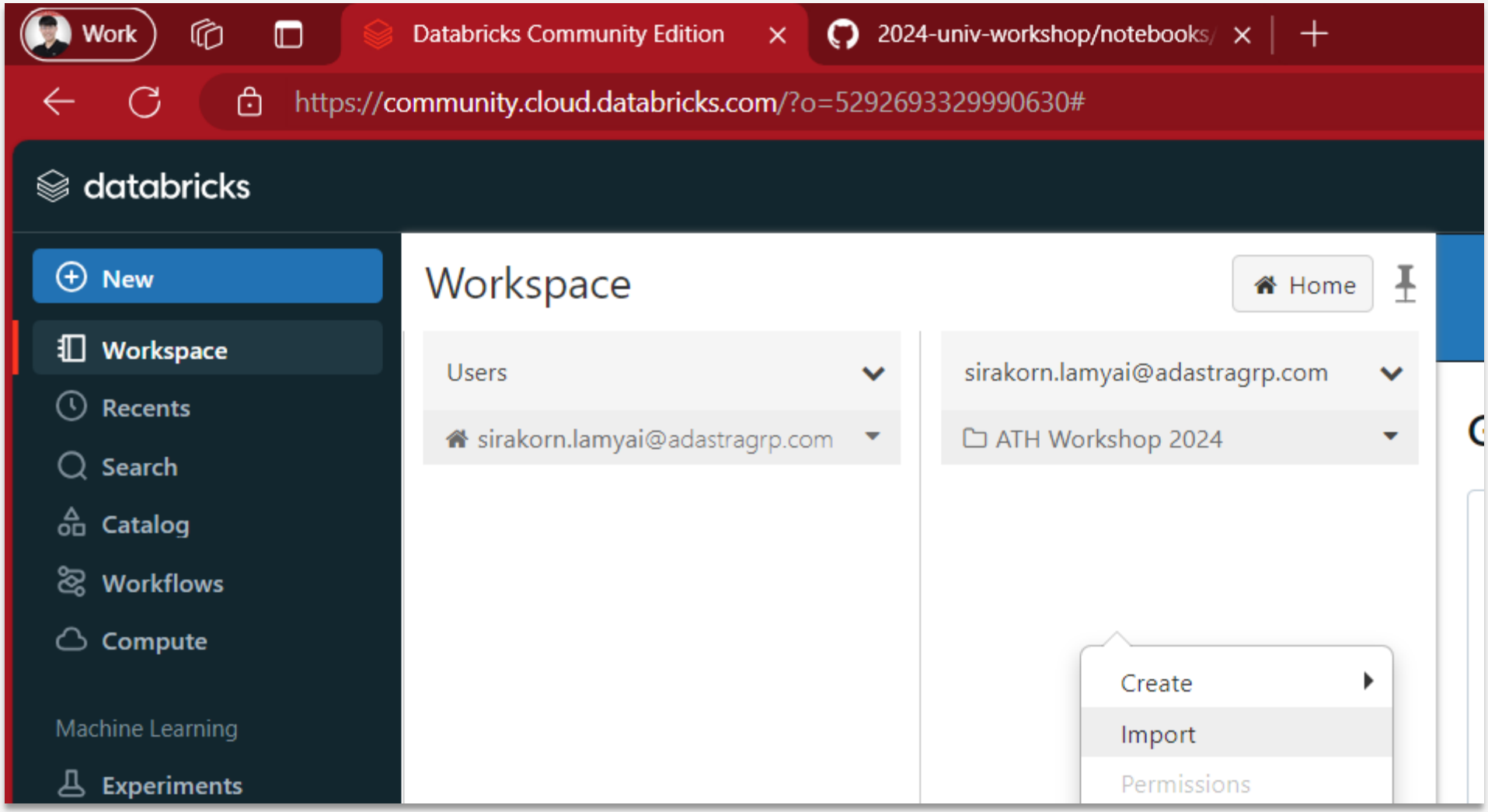
Databricks Lab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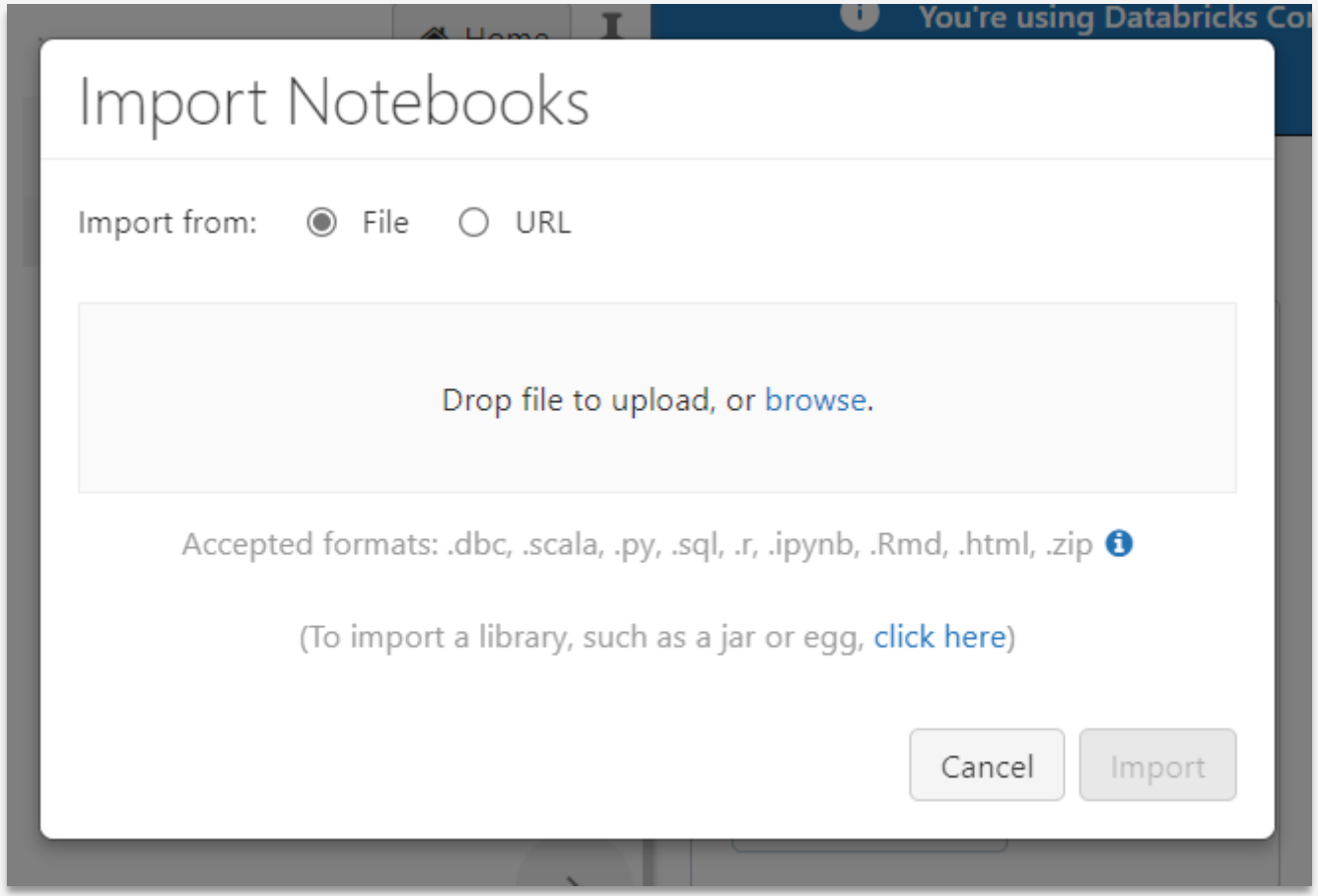

https://github.com/AdastraTH/2024-univ-workshop/raw/main/notebooks/ATH%20Workshop%202024.dbc