# Big Data Management
## Building a Big Data Architecture

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# Introduction and general framework

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- The **Big Data** era had begun, and the profile of the **Big Data engineer** emerged.

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- Open source developers and third parties started looking for ways to **abstract, simplify,** and make big data **available** without the high administrative overhead and cost of managing their clusters

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Data engineering is increasingly a discipline of interoperation; connecting various technologies in streamlined processing workflows to serve ultimate business goals.

# Introduction - Project Goal

To build a Big Data Management Architecture

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To build a Big Data Management Architecture

- Understanding the different stages of data management
- Defining the execution pipeline
- Selecting the appropriate tools/technologies
- Deploying and orchestrating the execution

# The Framework

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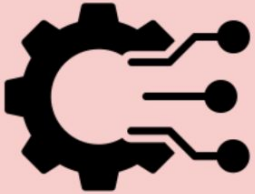
**Data Ingestion**



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# The Framework

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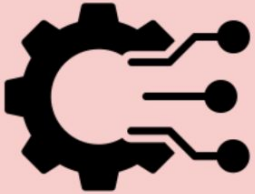
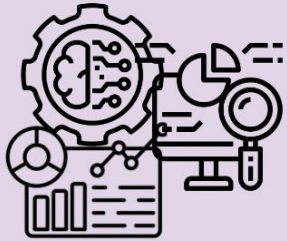
|  |  |  |  |  |
| Get data from the **sources** | Store the **raw** data | Apply **generic** data quality | **Arrange** data to be exploited | Get the data and generate **value** |

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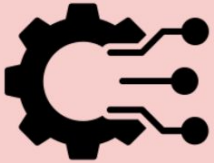
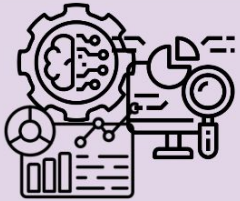
|  |  |  |  |  |  |
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- Always make sure to **justify** your decisions.

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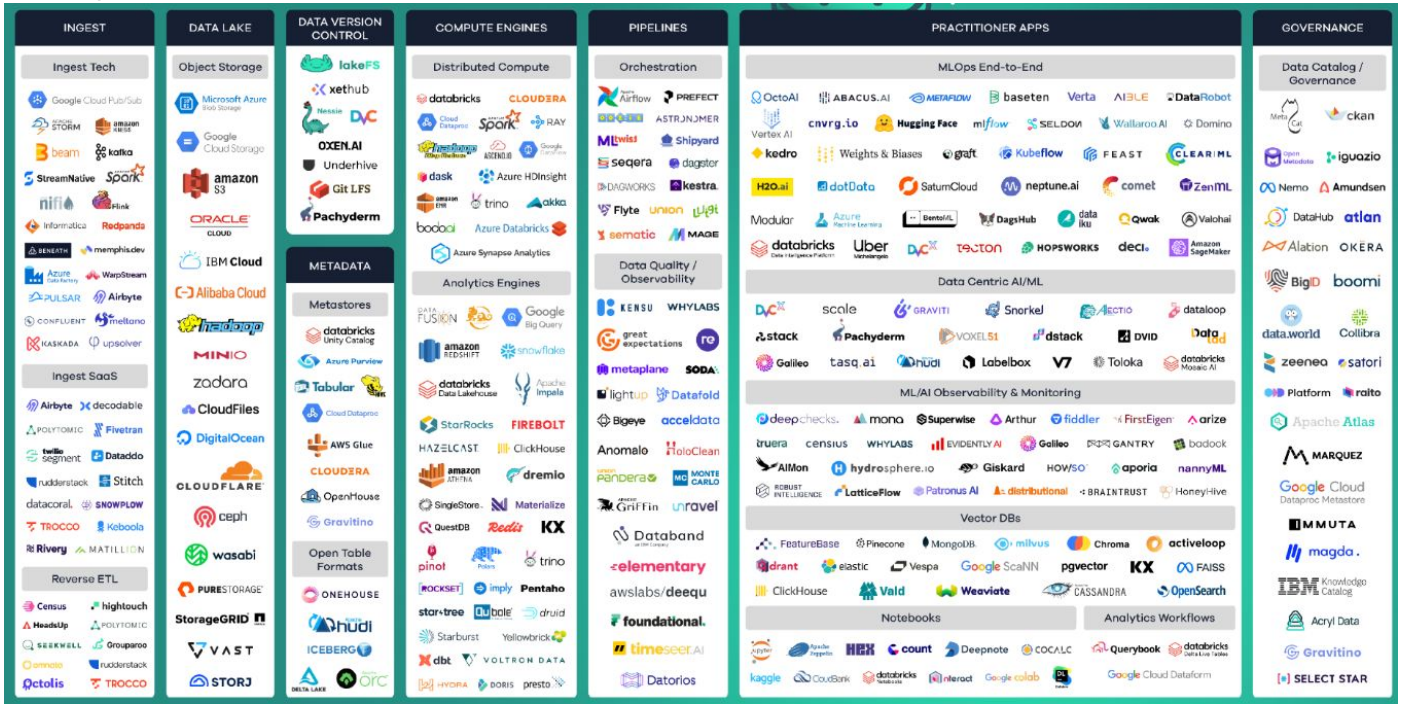
# Too many tools




Data management landscape in 2024 ([lakefs])

# Organization, deliverables and guidelines

(You have both this and the previous information in LearnSQL)

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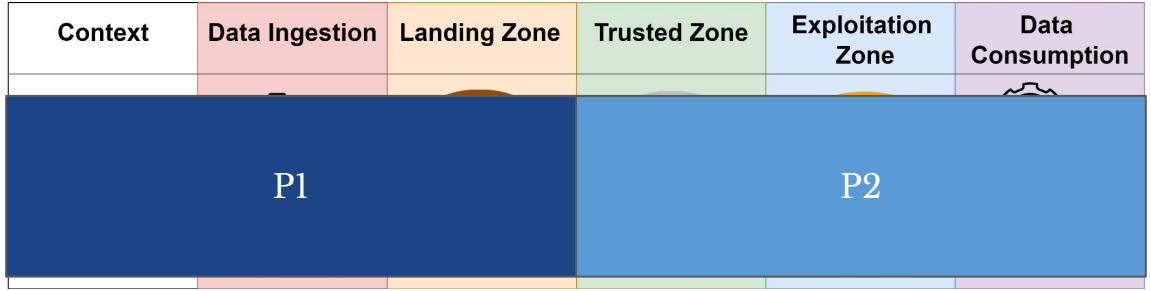

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  - A explanatory **document** of the project.
  - A project **repository** with the developed code.

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- In each deliverable we demand **two artifacts**
  - A explanatory **document** of the project.
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- The final grade of the project will be:

$$P = 0.5P1 + 0.5P2$$

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| | Week (Monday) | Project/Problems (Wednesday) | Theory (Thursday) |
|---|---|---|---|
| 1 | 2/10/2025 | (No class) | Introduction + Big Data Design |
| 2 | 2/17/2025 | P1-Presentation | Distributed Data Management |
| 3 | 2/24/2025 | Problems | Distributed Data Processing |
| 4 | 3/3/2025 | P1-Followup | Distributed File Systems |
| 5 | 3/10/2025 | Problems | Key-Value Stores |
| 6 | 3/17/2025 | P1-Followup | Document Stores |
| 7 | 3/24/2025 | Problems | Autonomous Learning (no class) |
| 8 | 3/31/2025 | Partials | P1-Delivery |
| 9 | 4/7/2025 | (No class) | Big Data Architectures |
| 10 | 4/14/2025 | Easter Week | |
| 11 | 4/21/2025 | P2-Presentation | MapReduce I |
| 12 | 4/28/2025 | Problems | May 1st |
| 13 | 5/5/2025 | P2-Followup | MapReduce II |
| 14 | 5/12/2025 | Problems | Spark |
| 15 | 5/19/2025 | P2-Followup | Stream Management |
| 16 | 5/26/2025 | Problems | Data Engineering |
| 17 | 6/2/2025 | P2-Delivery + Final Exam | |

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- **These will not directly count towards the grade**
  - The goal is to structure the development and provide better feedback
  - If significant effort is show, it will be taken into consideration for the final evaluation

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- The implementation has to present the desirable properties of software development
  - That is, dynamicity, reusability, openness, reproducibility, etc.

# Evaluation guidelines

We want you to be ambitious and develop a complex project