Data engineering and big data

UNDERSTANDING DATA ENGINEERING

About the course

- Conceptual course
- No coding involved
- **Objectives**
  - Being able to exchange with data engineers
  - Provide a solid foundation to learn more

Chapter 1

What is data engineering?

1. Data engineering and big data
2. Data engineers vs. data scientists
3. Data pipelines

Chapter 2

How data storage works

1. Structured vs unstructured data
2. SQL
3. Data warehouse and data lakes

Chapter 3

How to move and process data

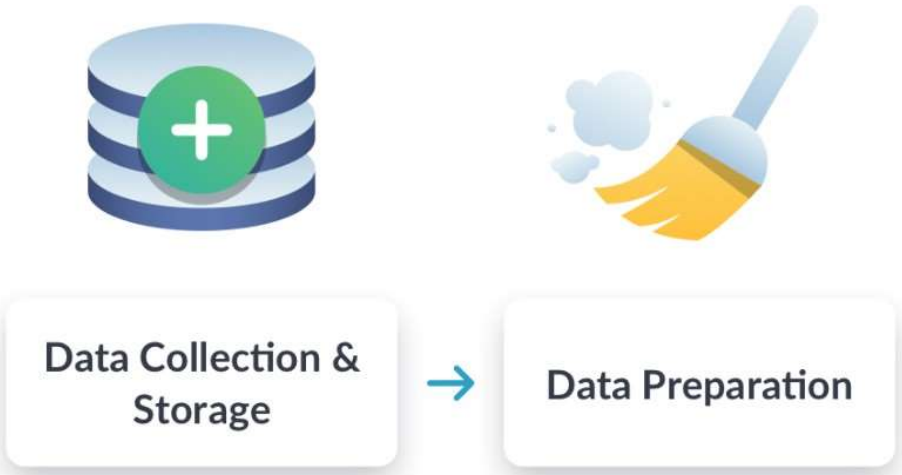
1. Processing data
2. Scheduling data
3. Parallel computing
4. Cloud computing

Spotflix

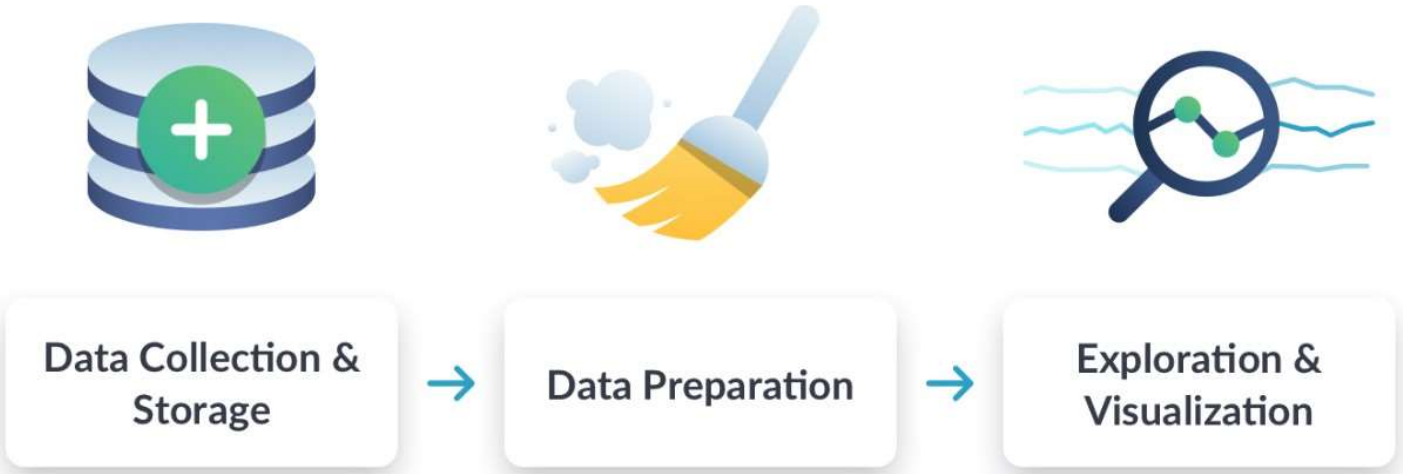
Data workflow

Data Collection & Storage

Data workflow



Data workflow



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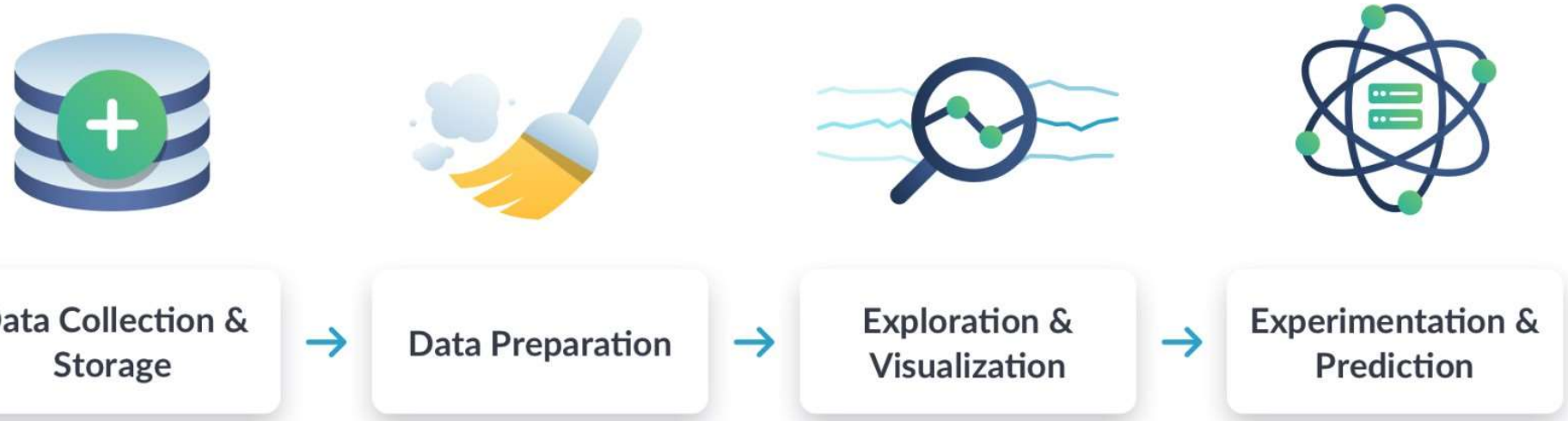
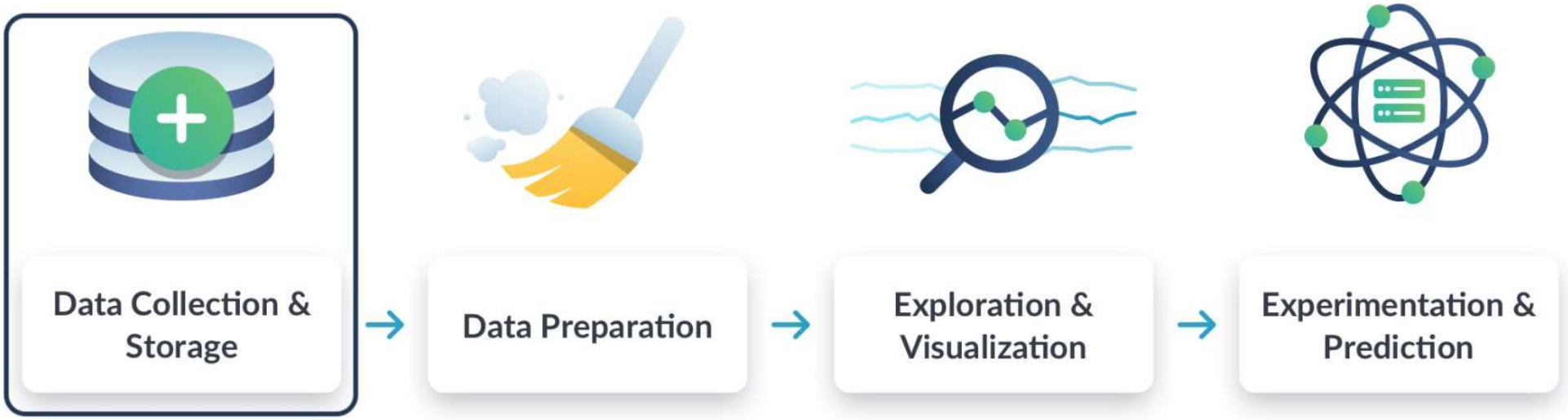


Data engineers



Data engineers

Data engineers deliver:

- the correct data
- in the right form
- to the right people
- as efficiently as possible

A data engineer's responsibilities

- Ingest data from different sources
- Optimize databases for analysis
- Remove corrupted data
- Develop, construct, test and maintain data architectures

Data engineers and big data

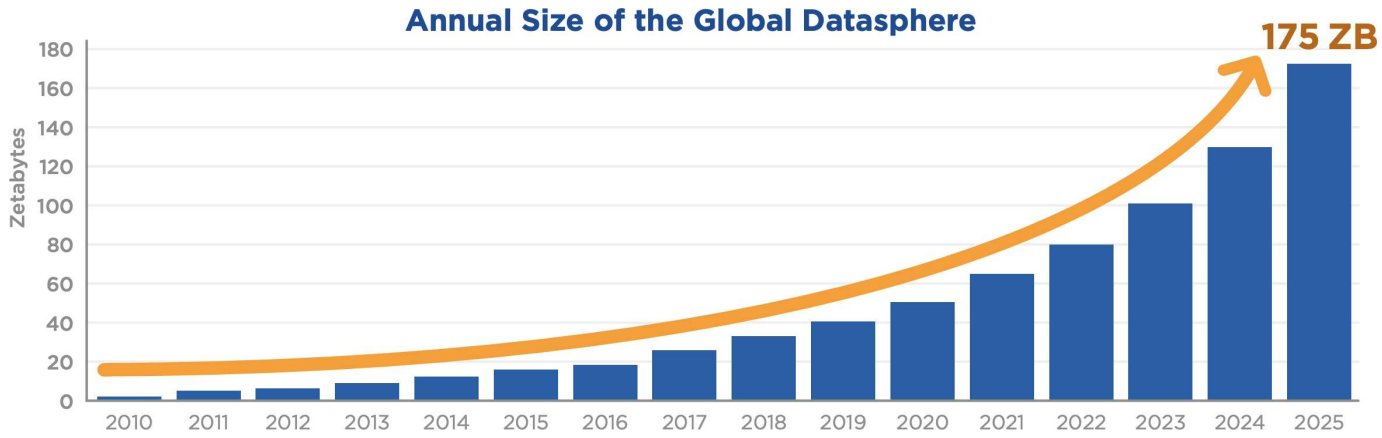
- Big data becomes the norm =>

Data engineers and big data

- Big data becomes the norm => data engineers are more and more needed
- Big data:
  - Have to think about how to deal with its size
  - So large traditional methods don't work anymore

Big data growth

- Sensors and devices
- Social media
- Enterprise data
- VoIP (voice communication, multimedia sessions)



[1] Data Age 2025, Seagate, November 2018

The five Vs

- Volume (how much?)
- Variety (what kind?)
- Velocity (how frequent?)
- Veracity (how accurate?)
- Value (how useful?)

Summary

- What's waiting for you
- How data flows through an organization
- When a data engineer intervenes
- What their responsibilities are
- How data engineering relates to big data

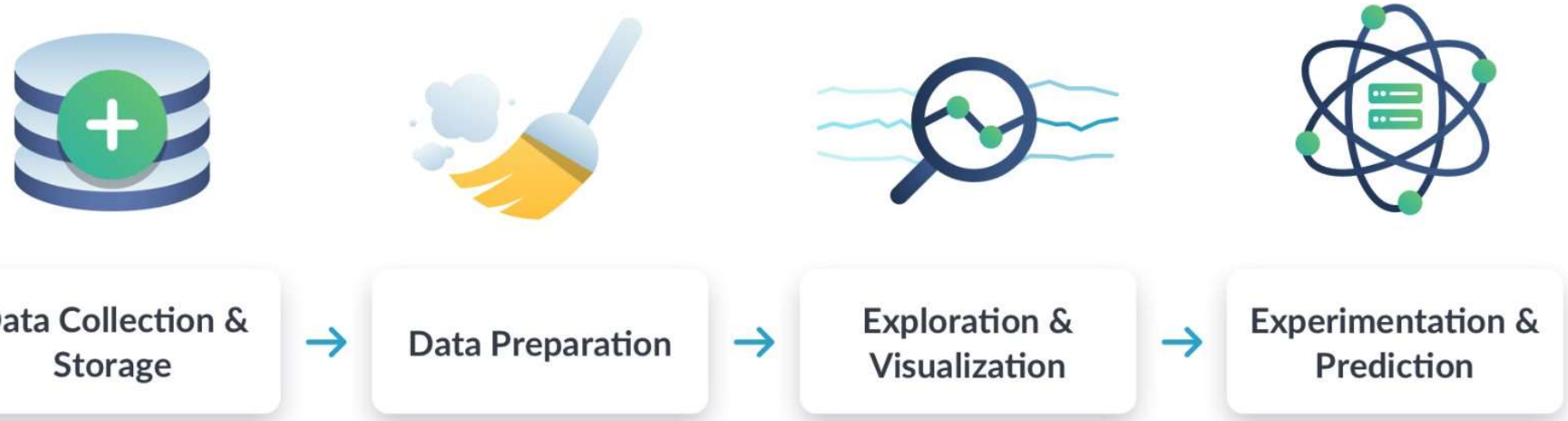
Let's practice!

UNDERSTANDING DATA ENGINEERING

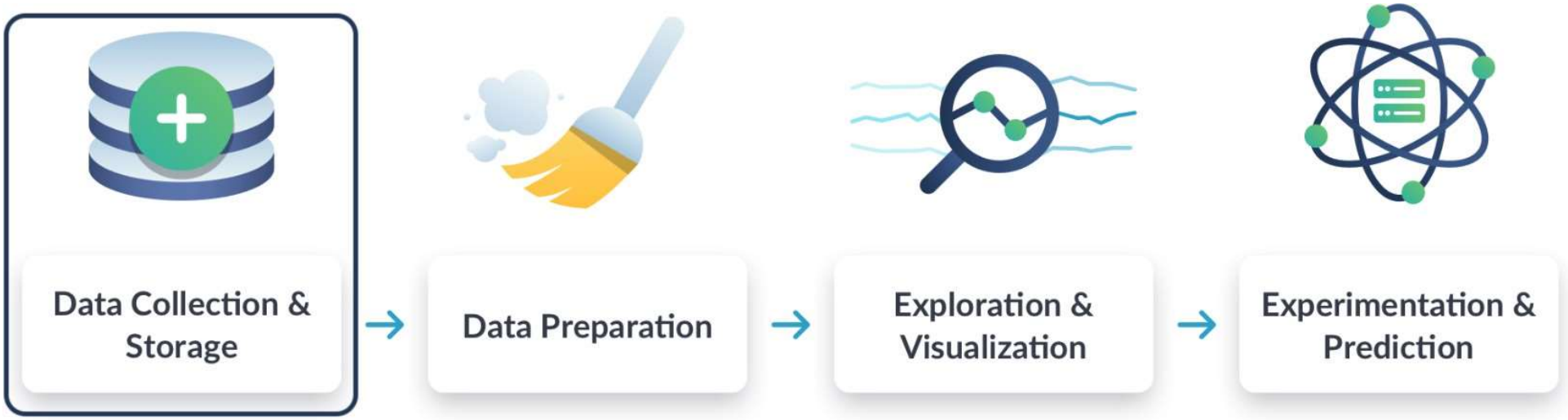
Data engineers vs. data scientists

UNDERSTANDING DATA ENGINEERING

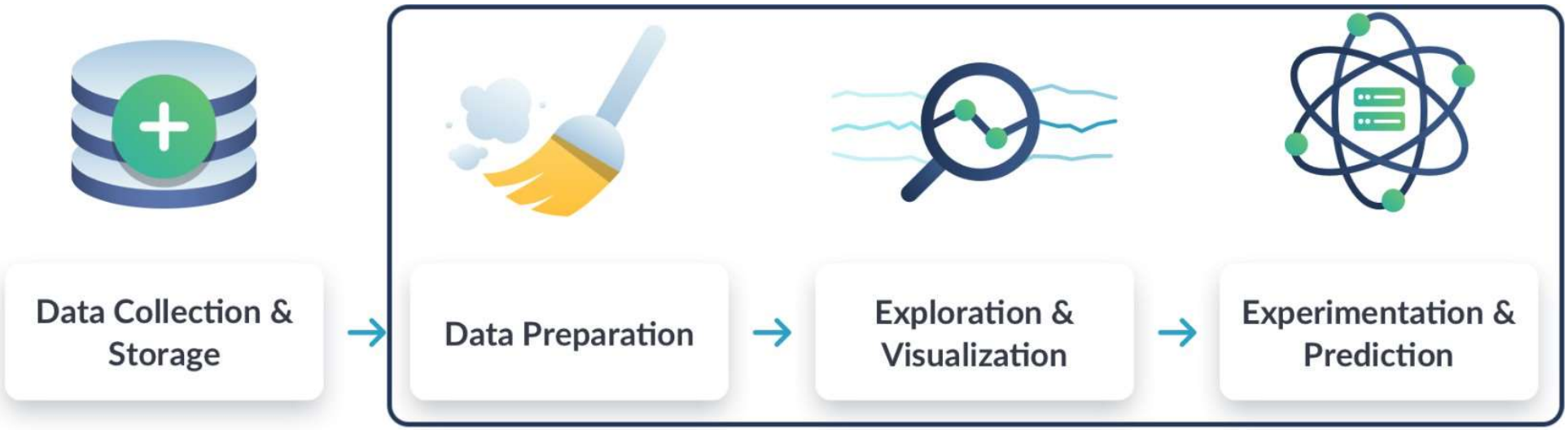
Data workflow



Data engineers



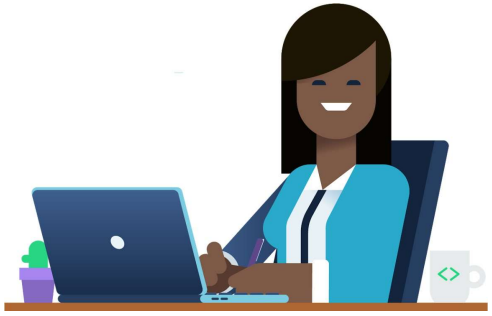
Data scientists



Data engineers enable data scientists

Data engineer

- Ingest and store data
- Set up databases
- Build data pipelines
- Strong software skills



Data scientist

- Exploit data
- Access databases
- Use pipeline outputs
- Strong analytical skills

Summary

- At which stages data engineers and data scientists intervene
- How data engineers enable data scientists

Let's practice!

UNDERSTANDING DATA ENGINEERING

The data pipeline

UNDERSTANDING DATA ENGINEERING

If data is the new oil...

[1] The Economist, 2017-05-06, by David Parkins

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heavy oil
residue

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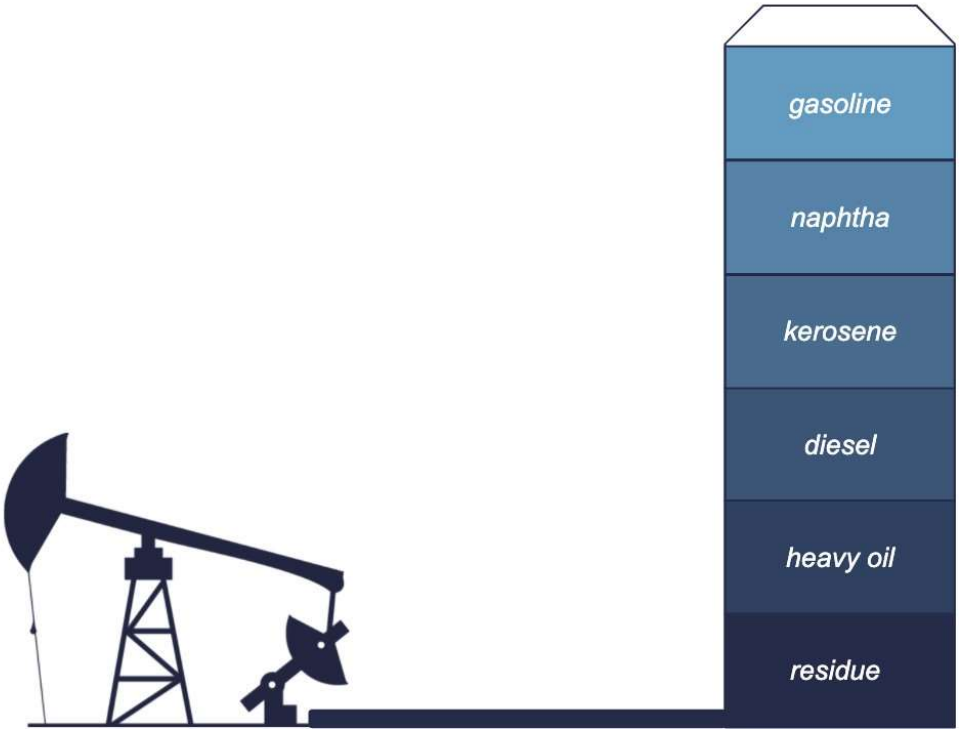
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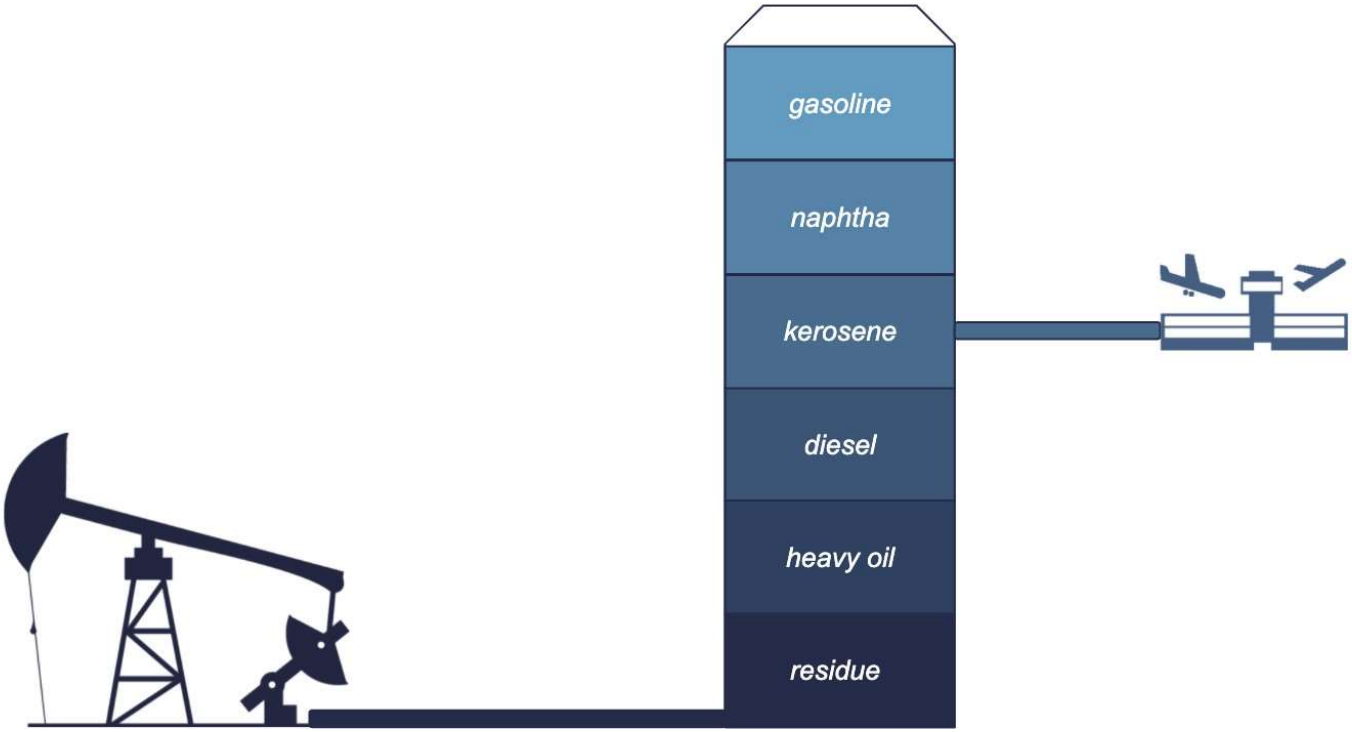
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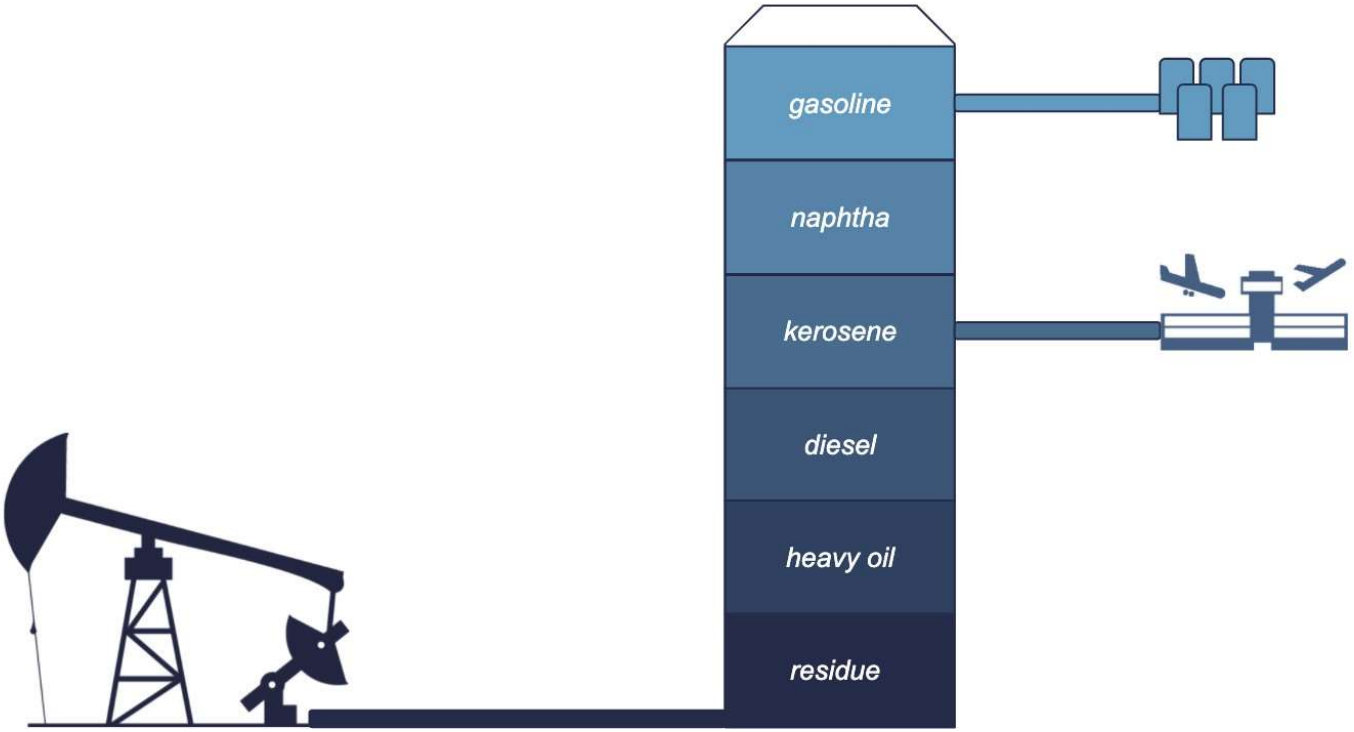
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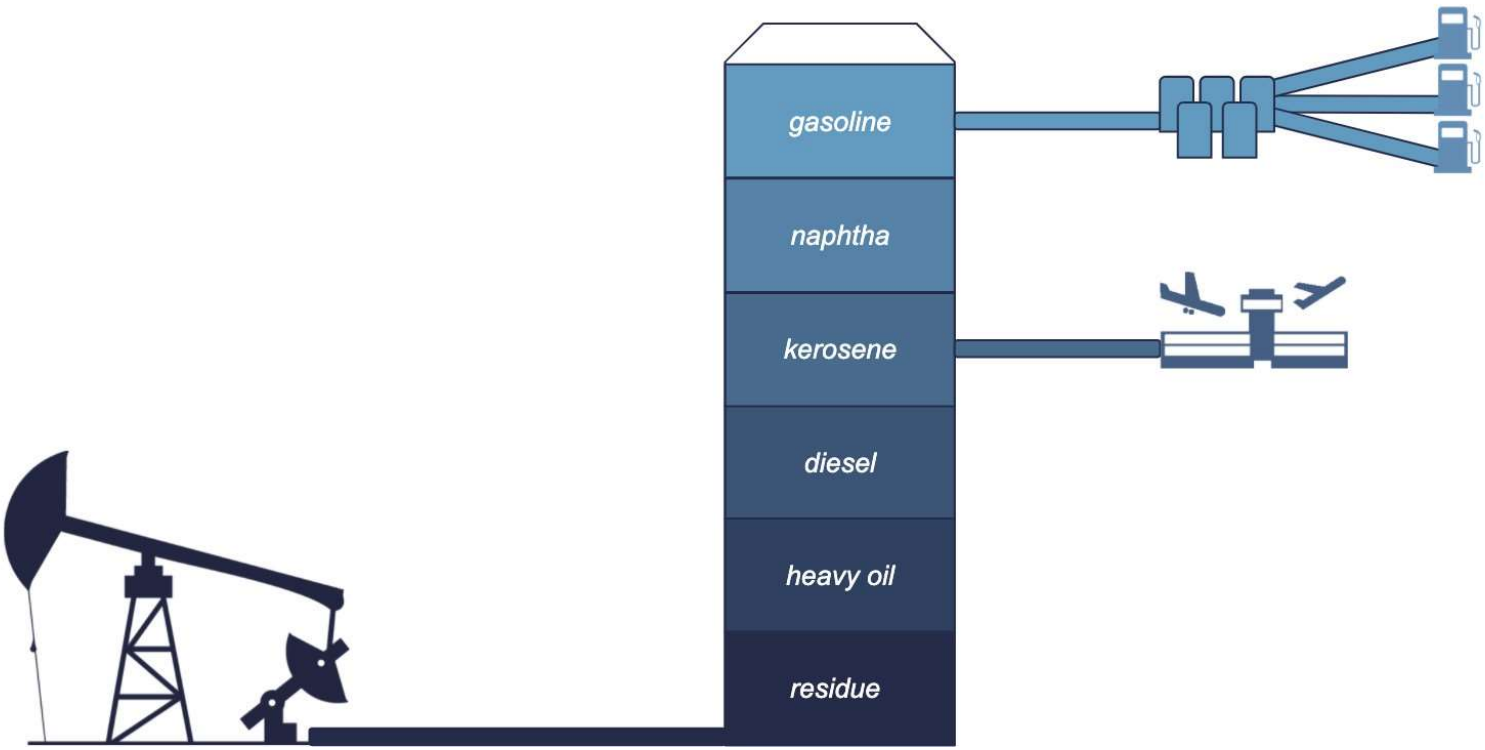
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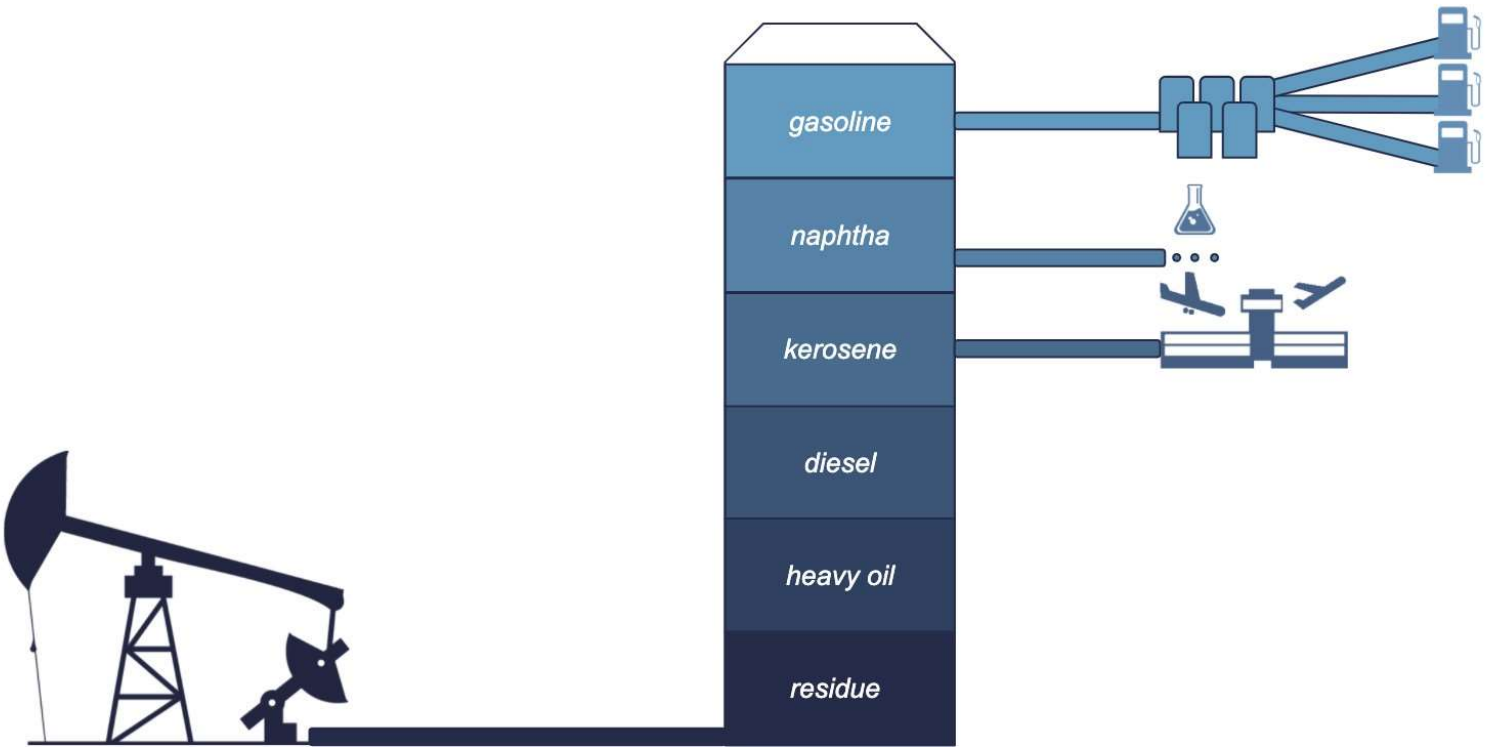
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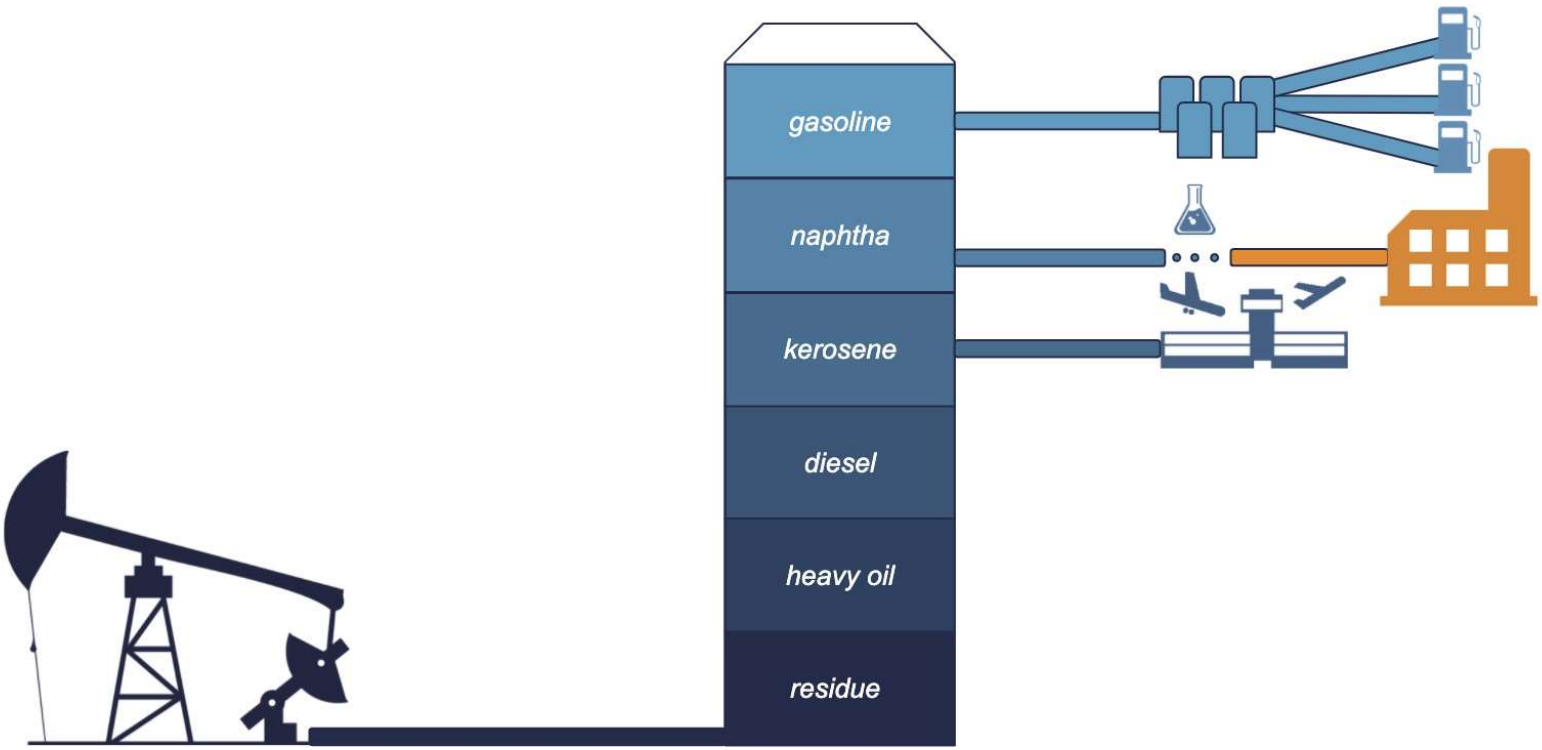
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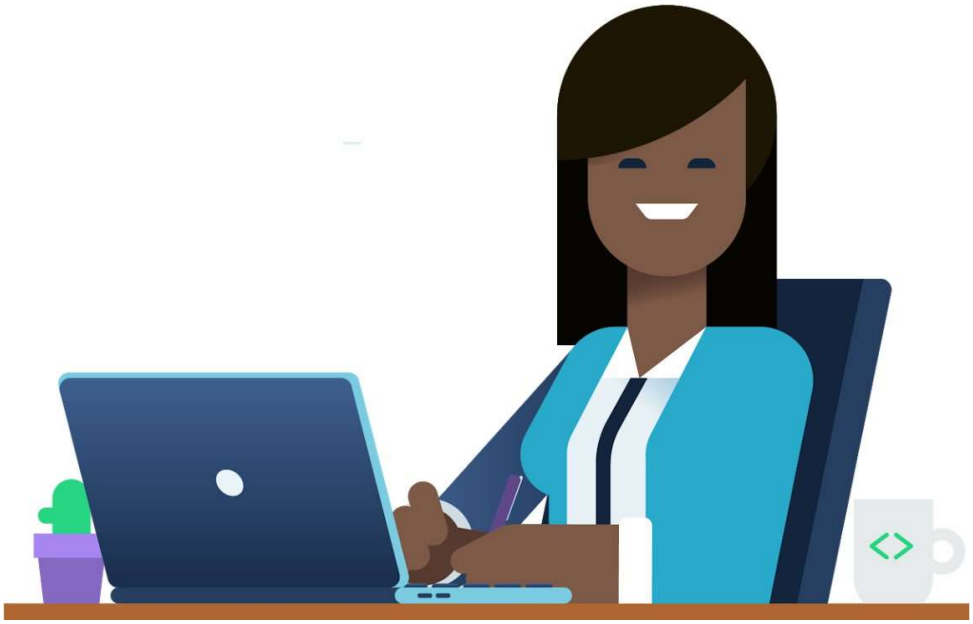
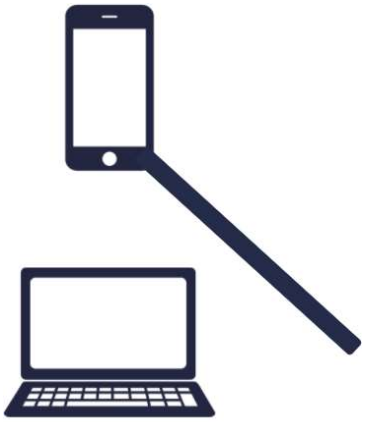
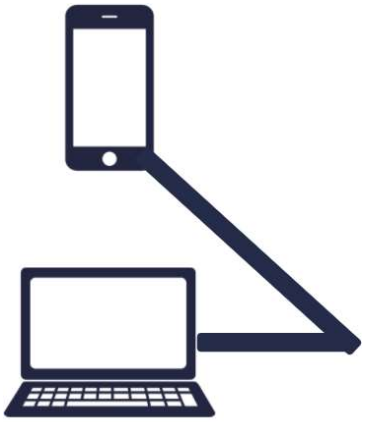
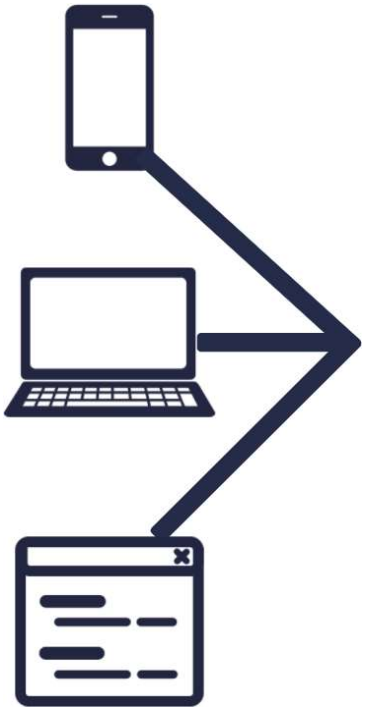
Back to data engineering

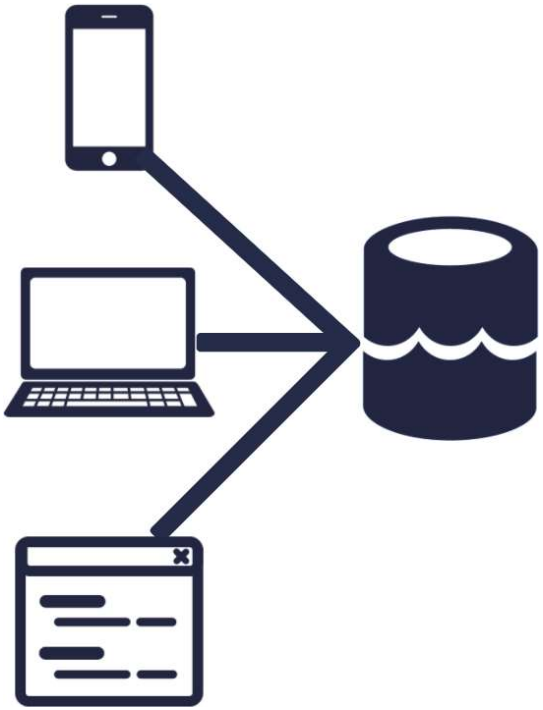
- Ingest
- Process
- Store
- Need pipelines
- Automate flow from one station to the next
- Provide up-to-date, accurate, relevant data

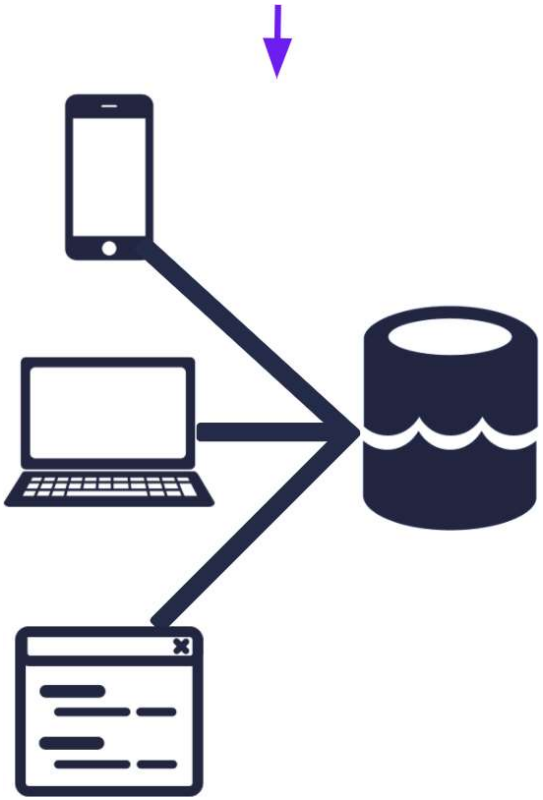


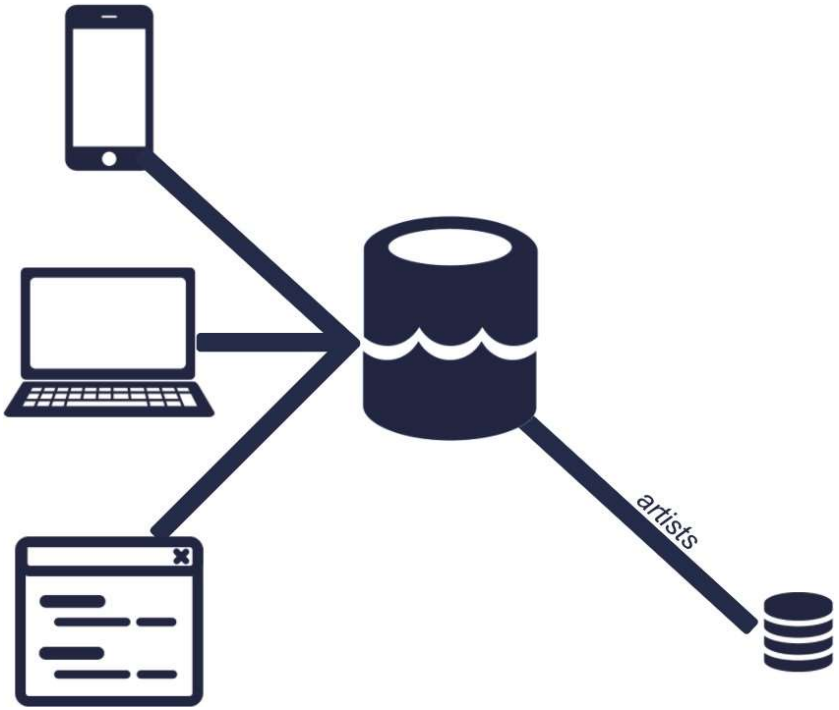








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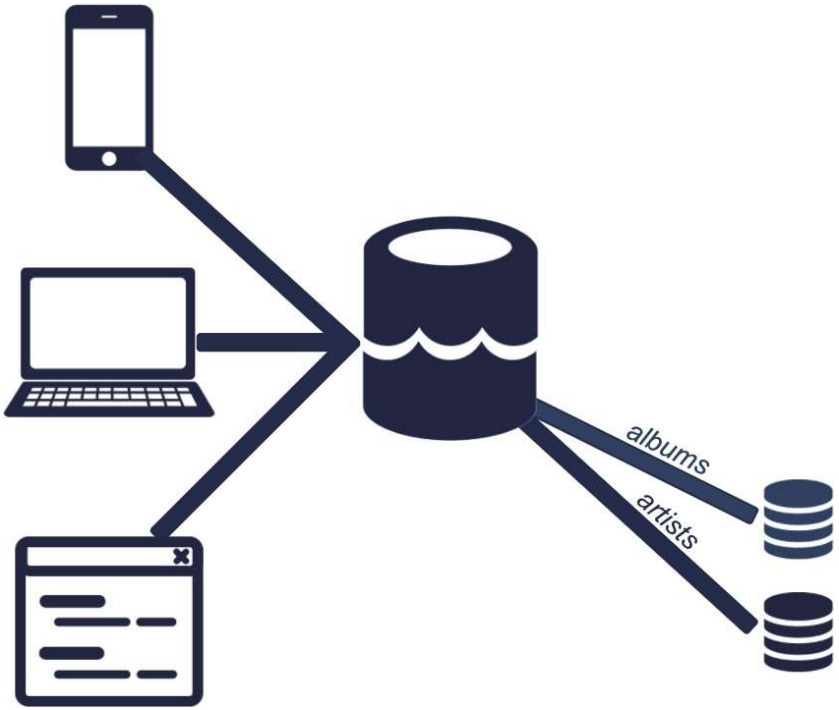
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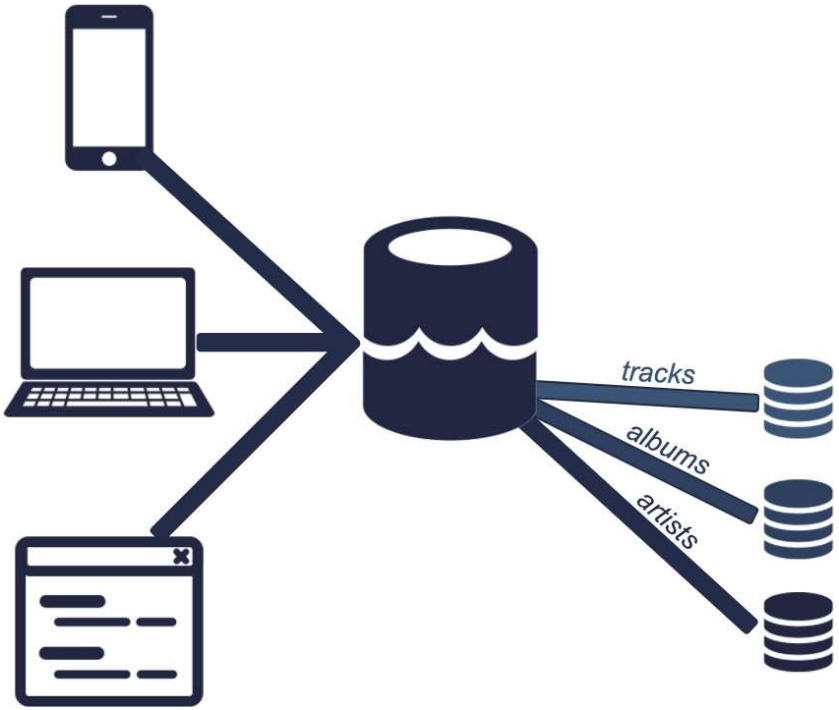
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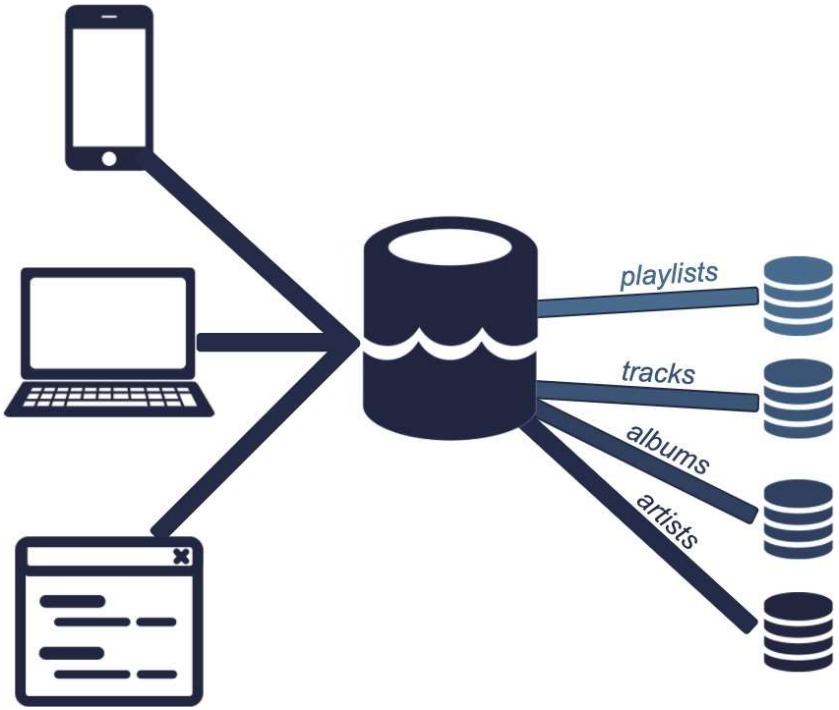
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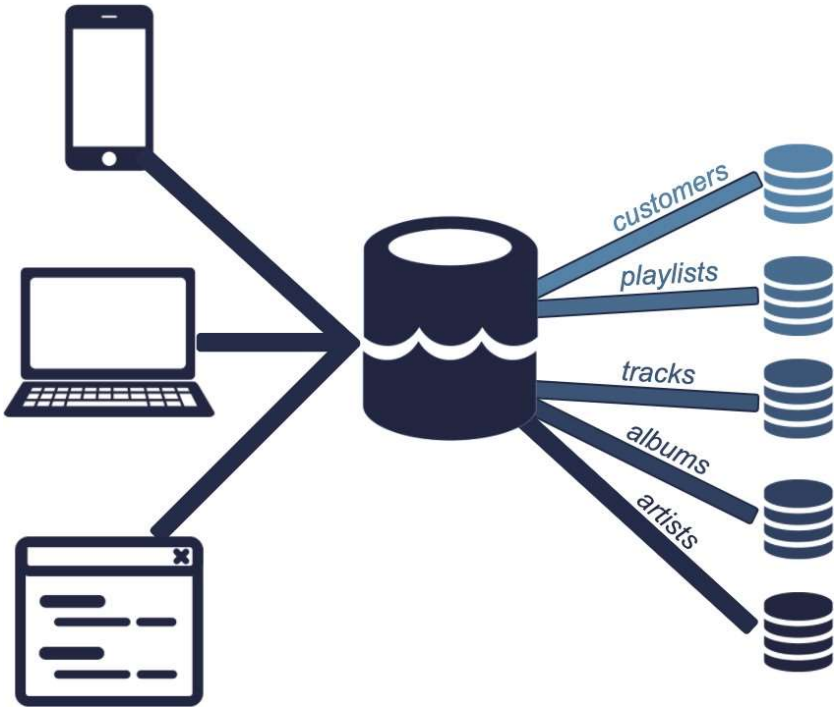
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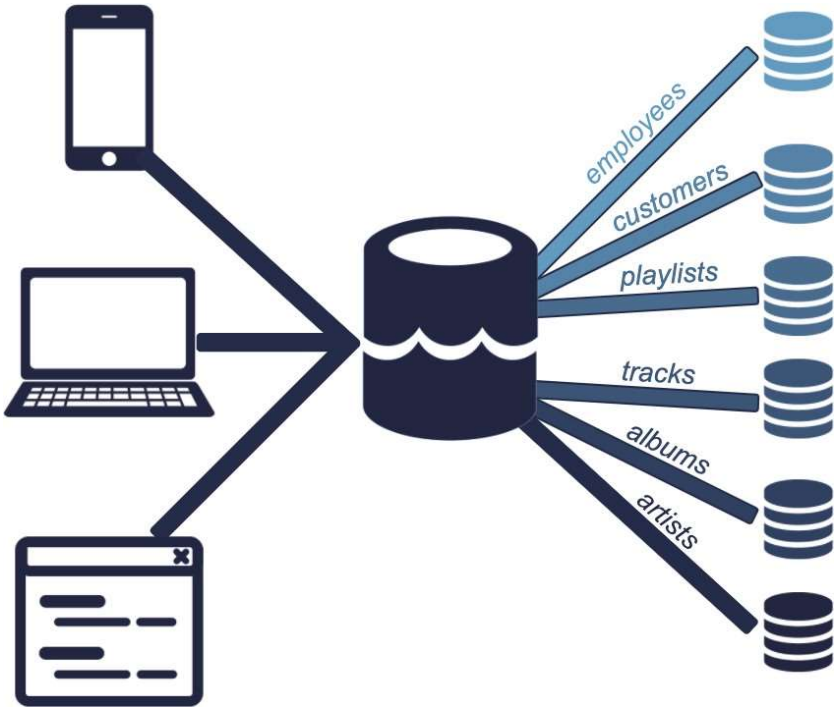
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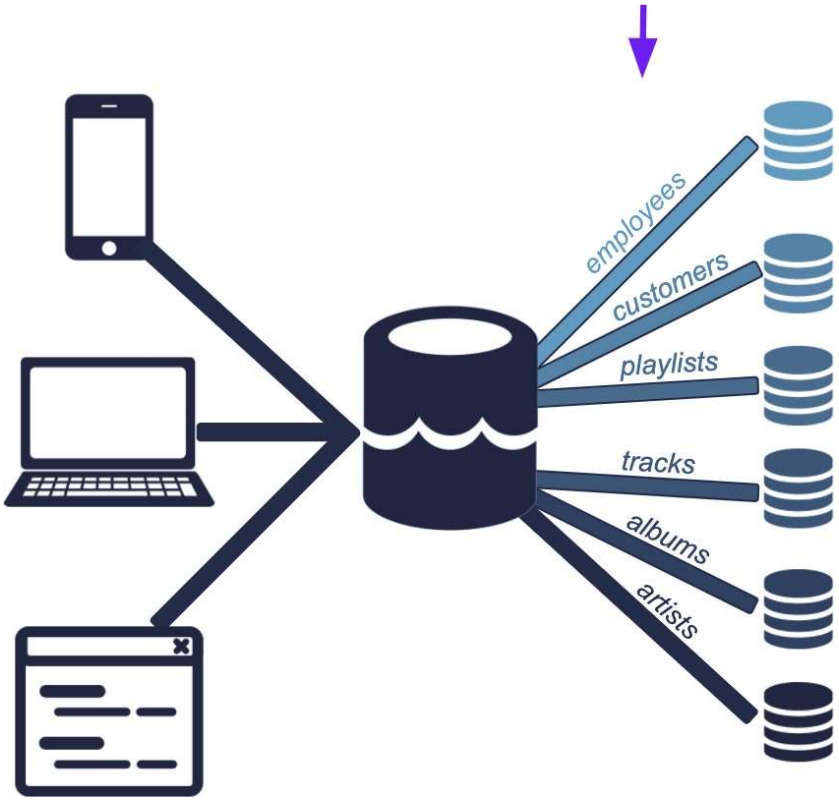
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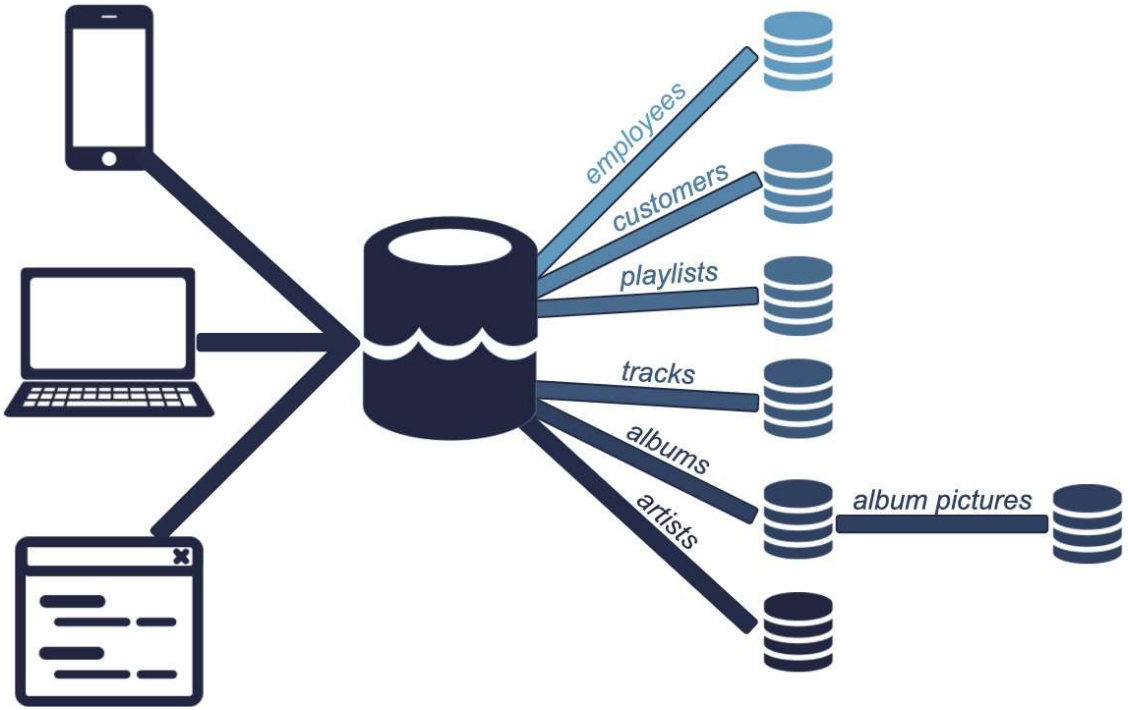
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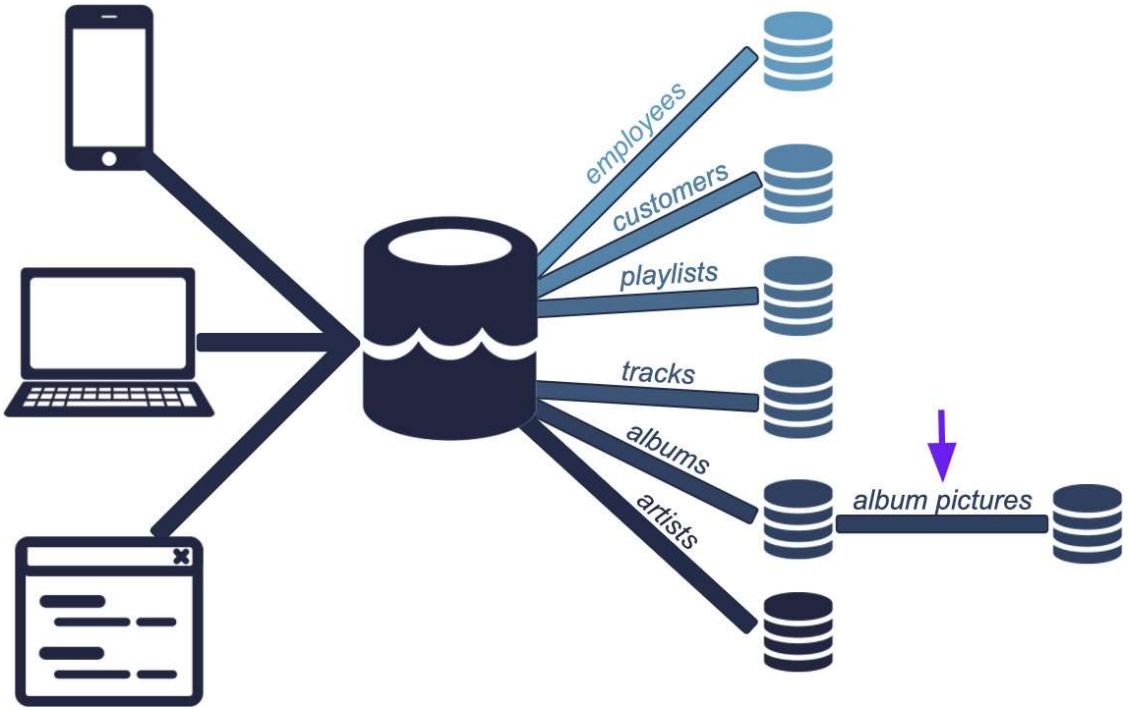
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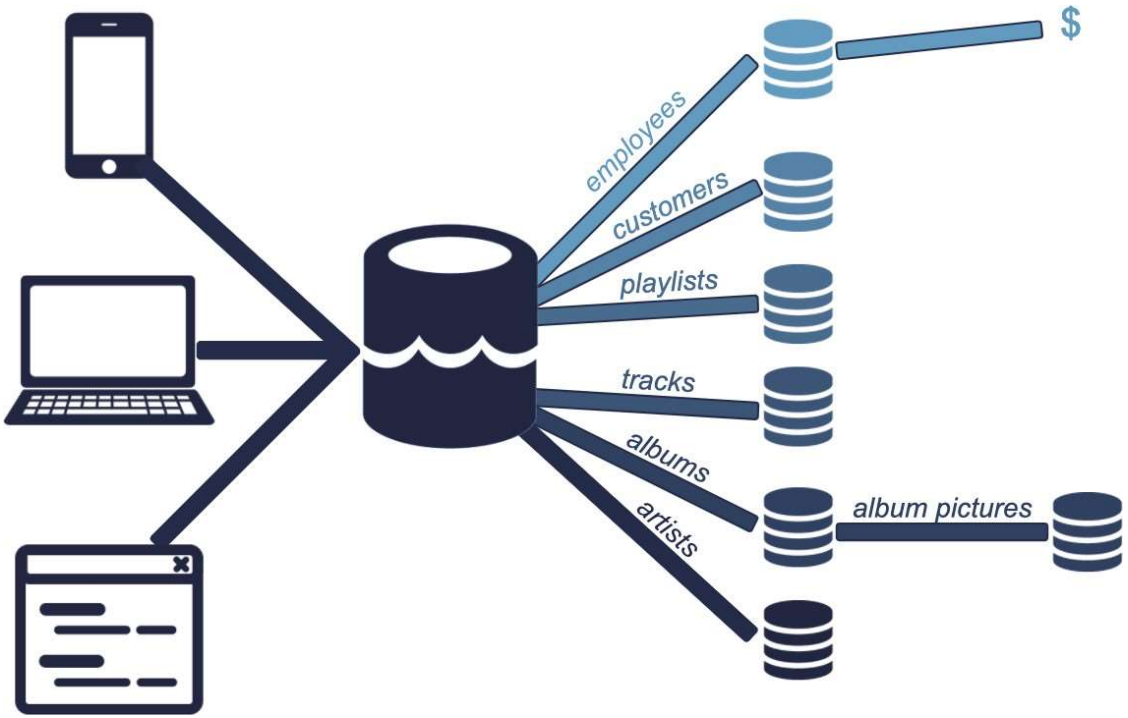
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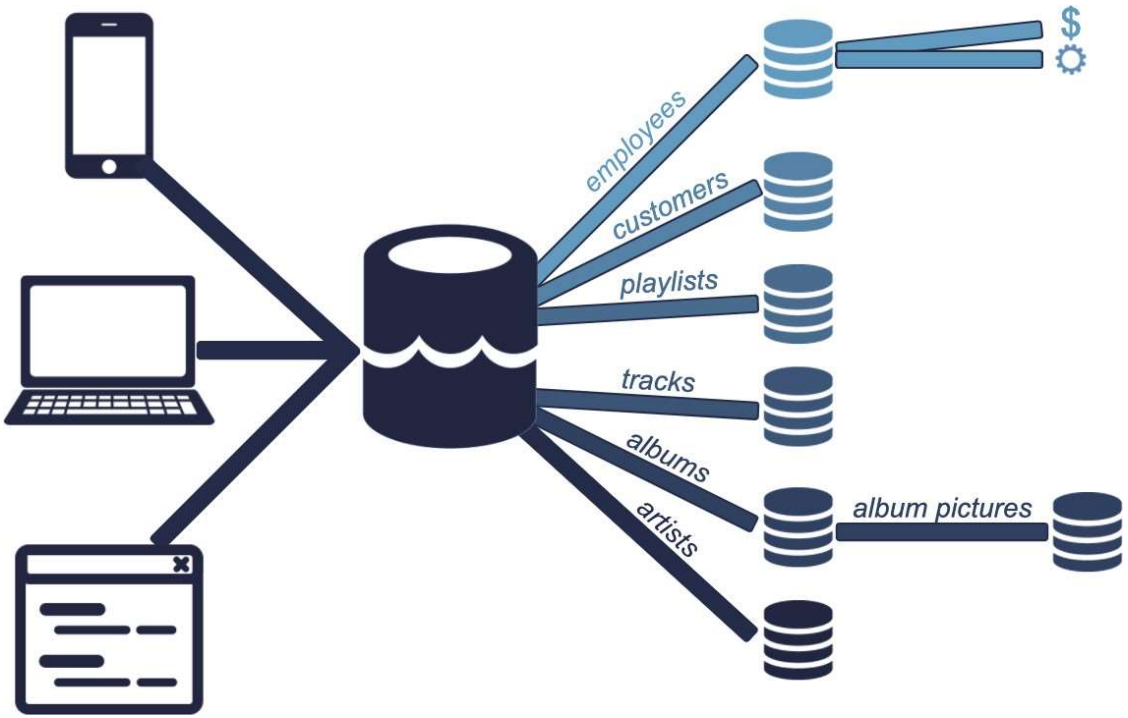
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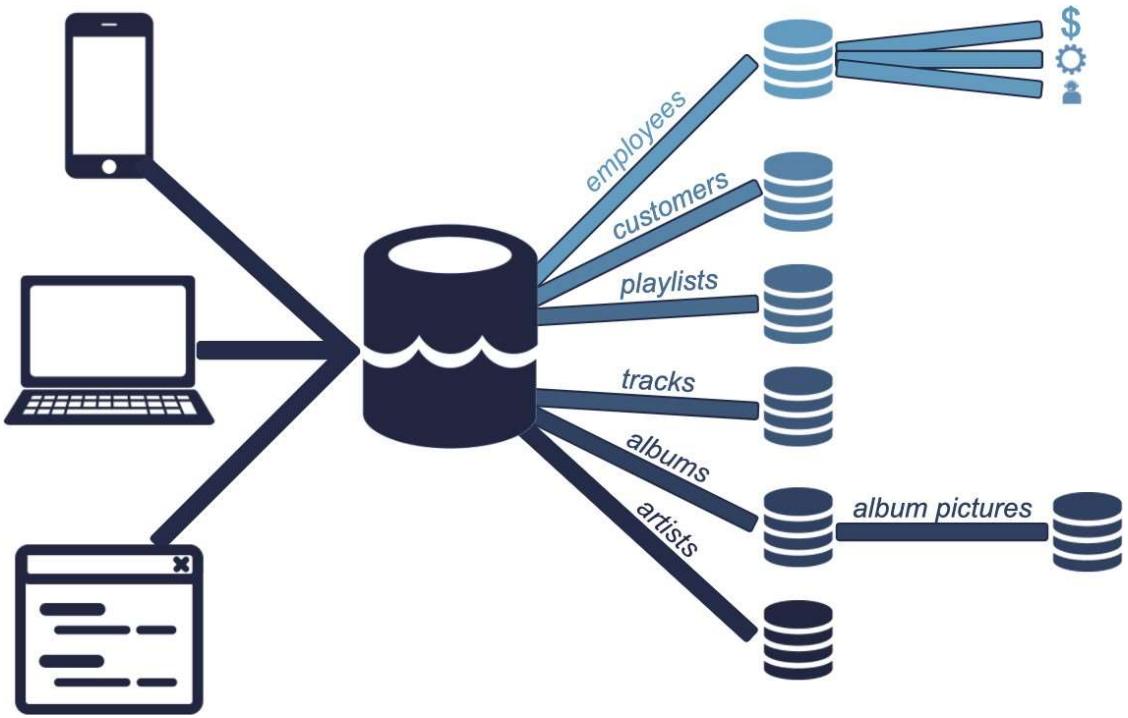
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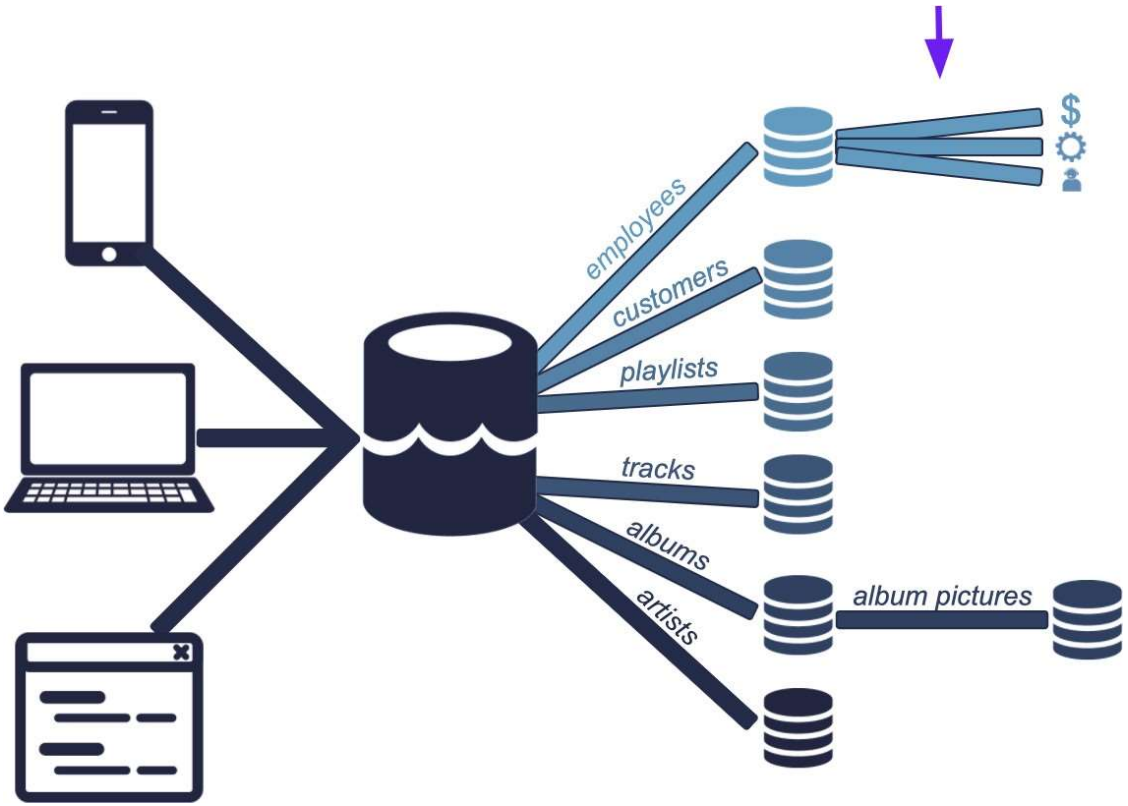
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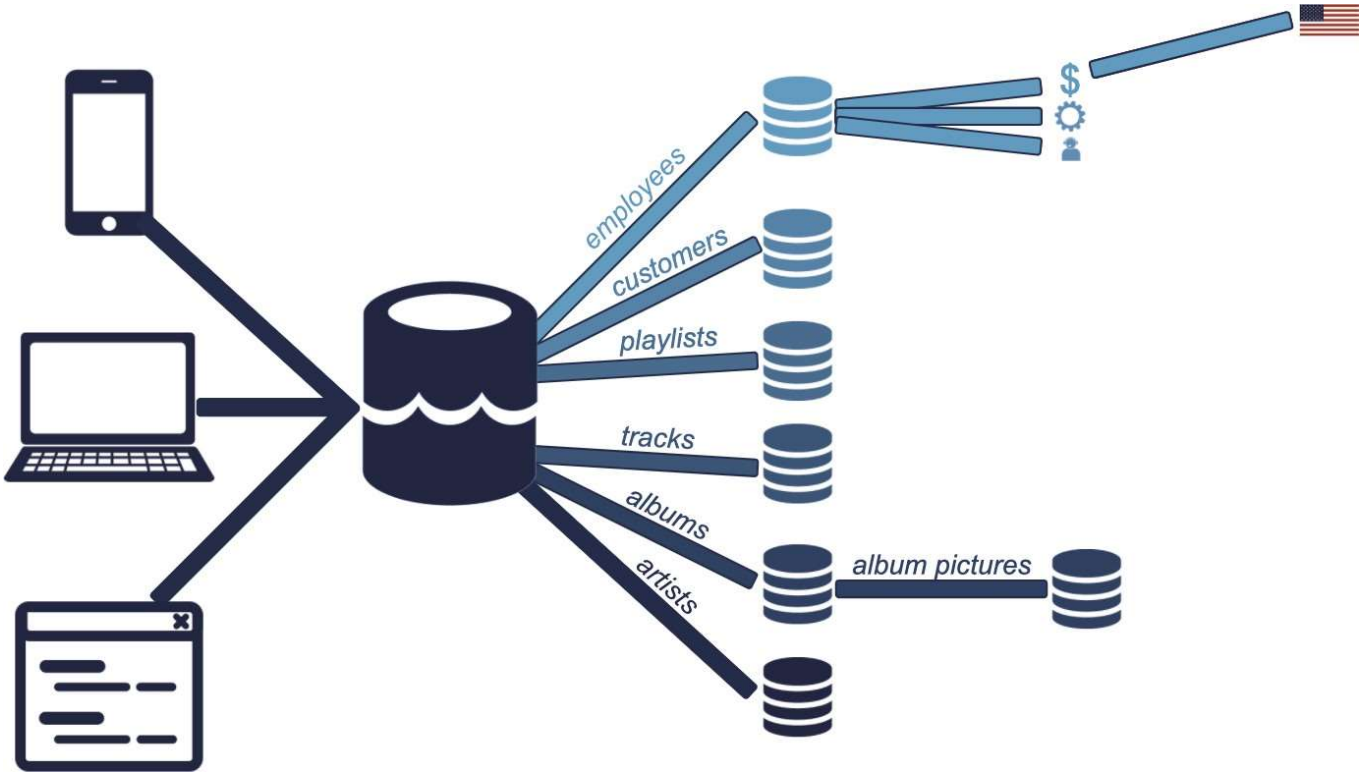
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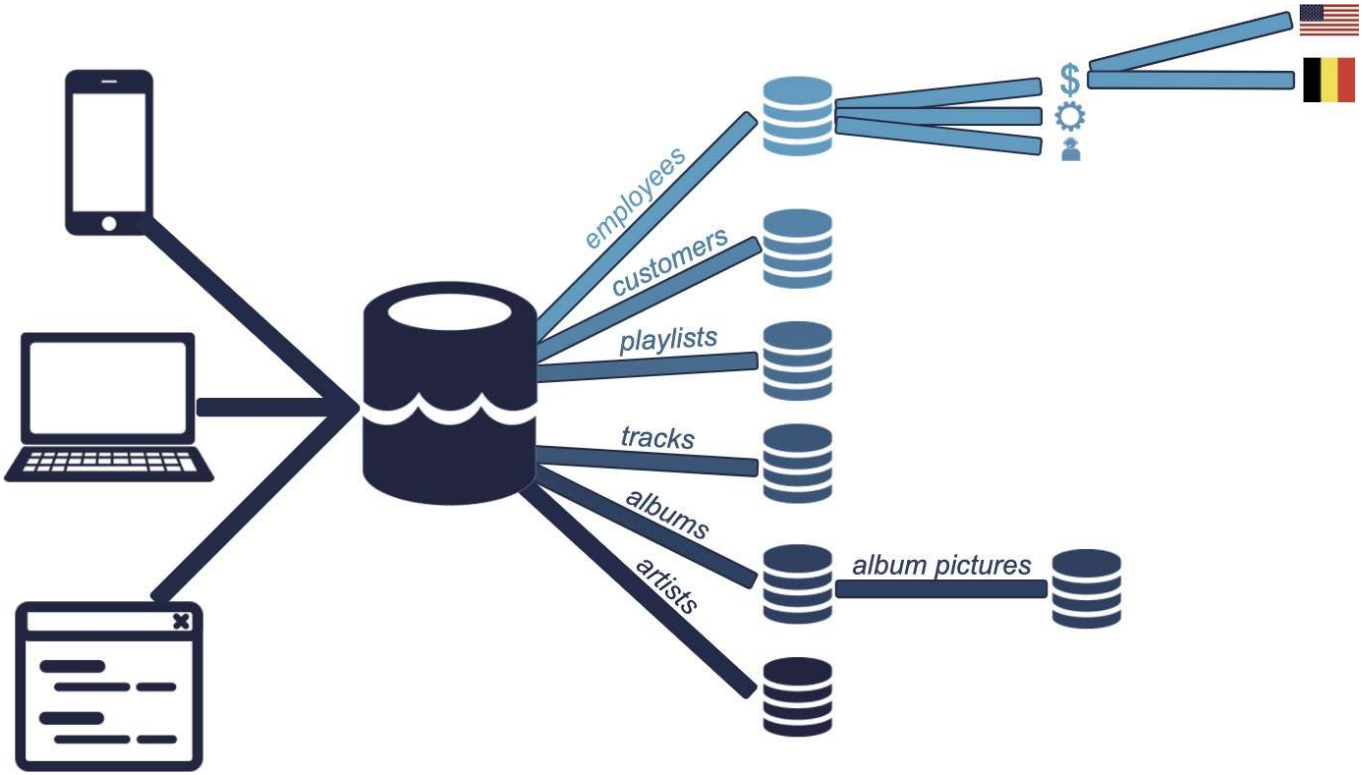
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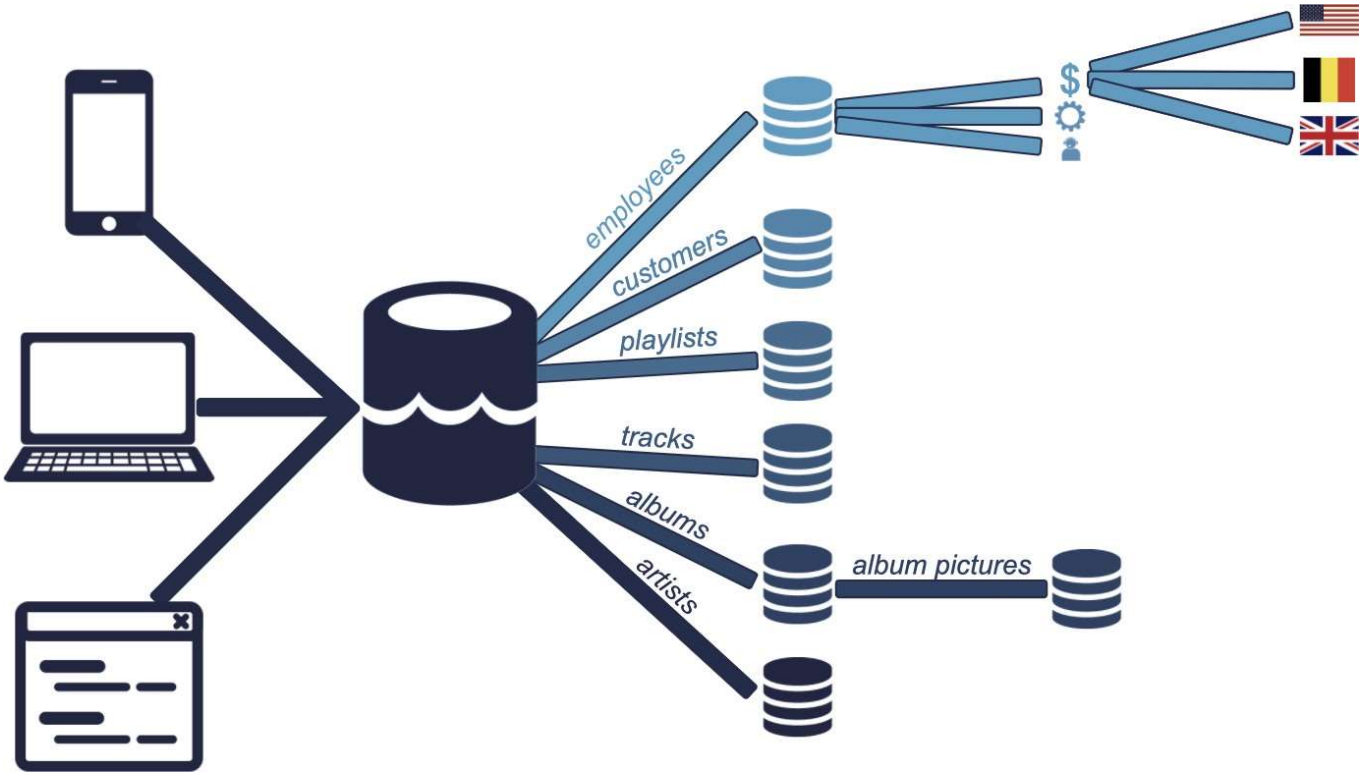
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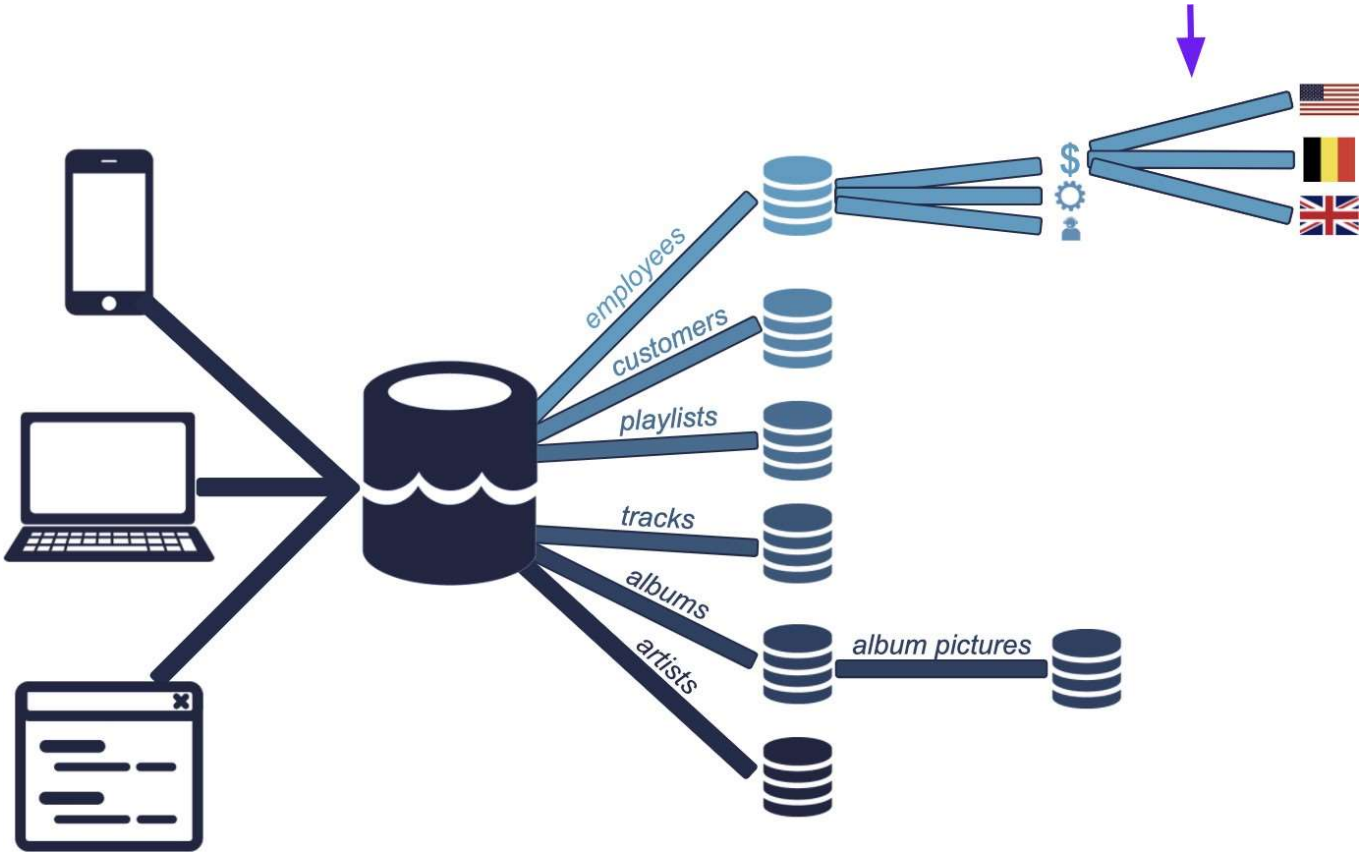
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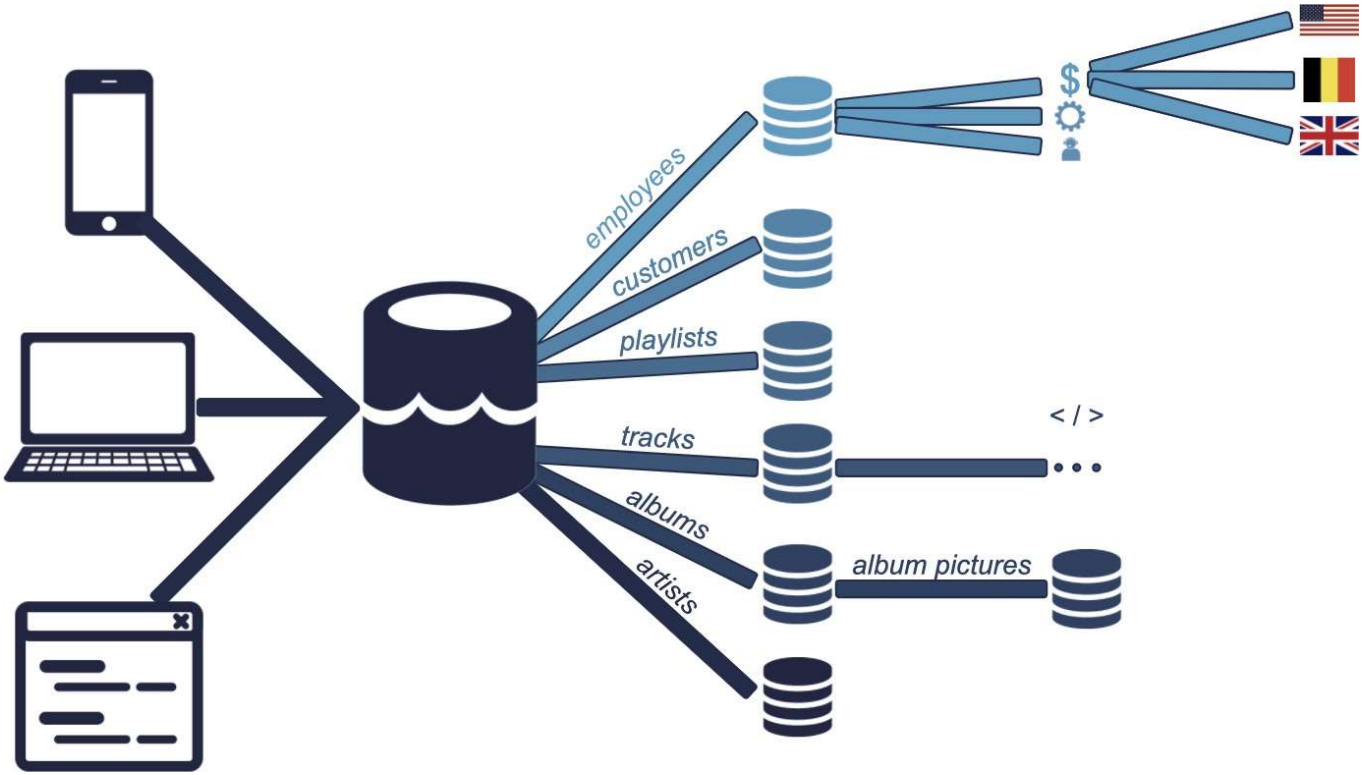
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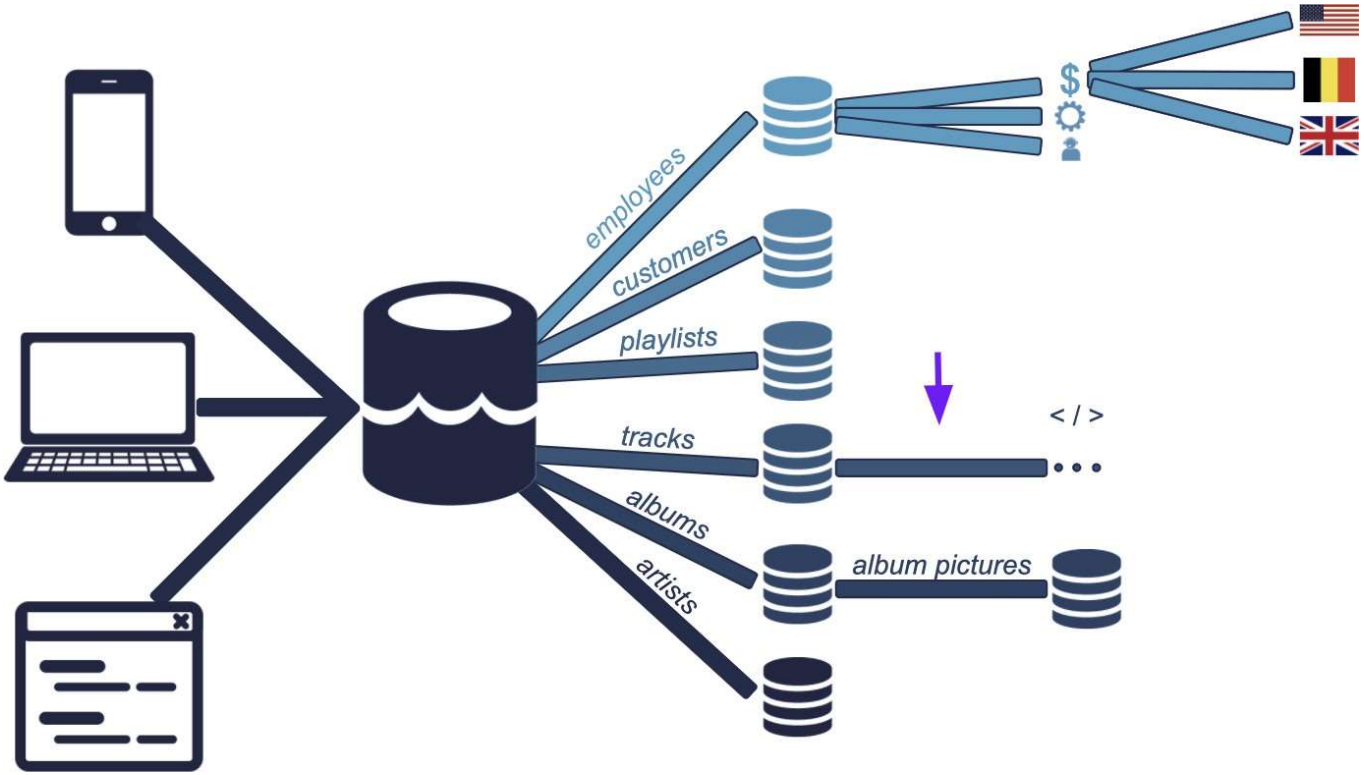
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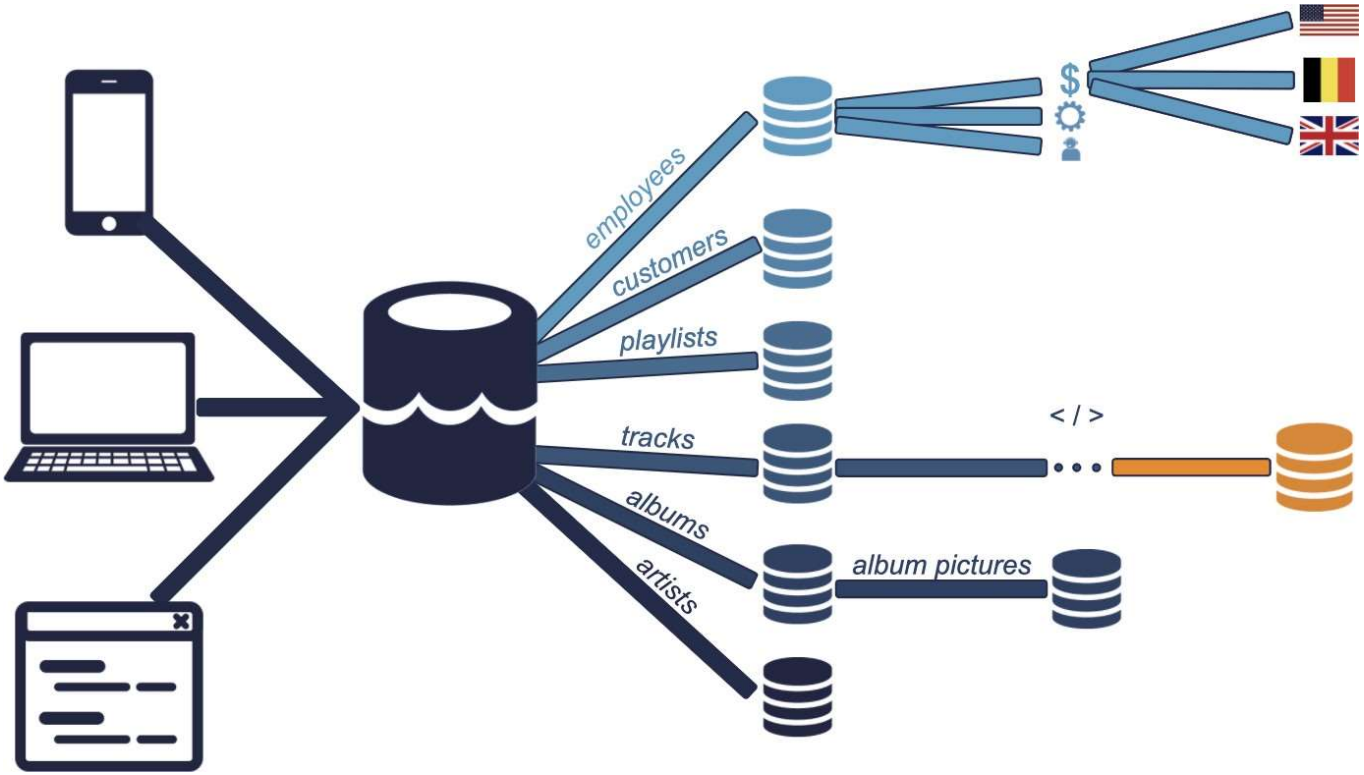
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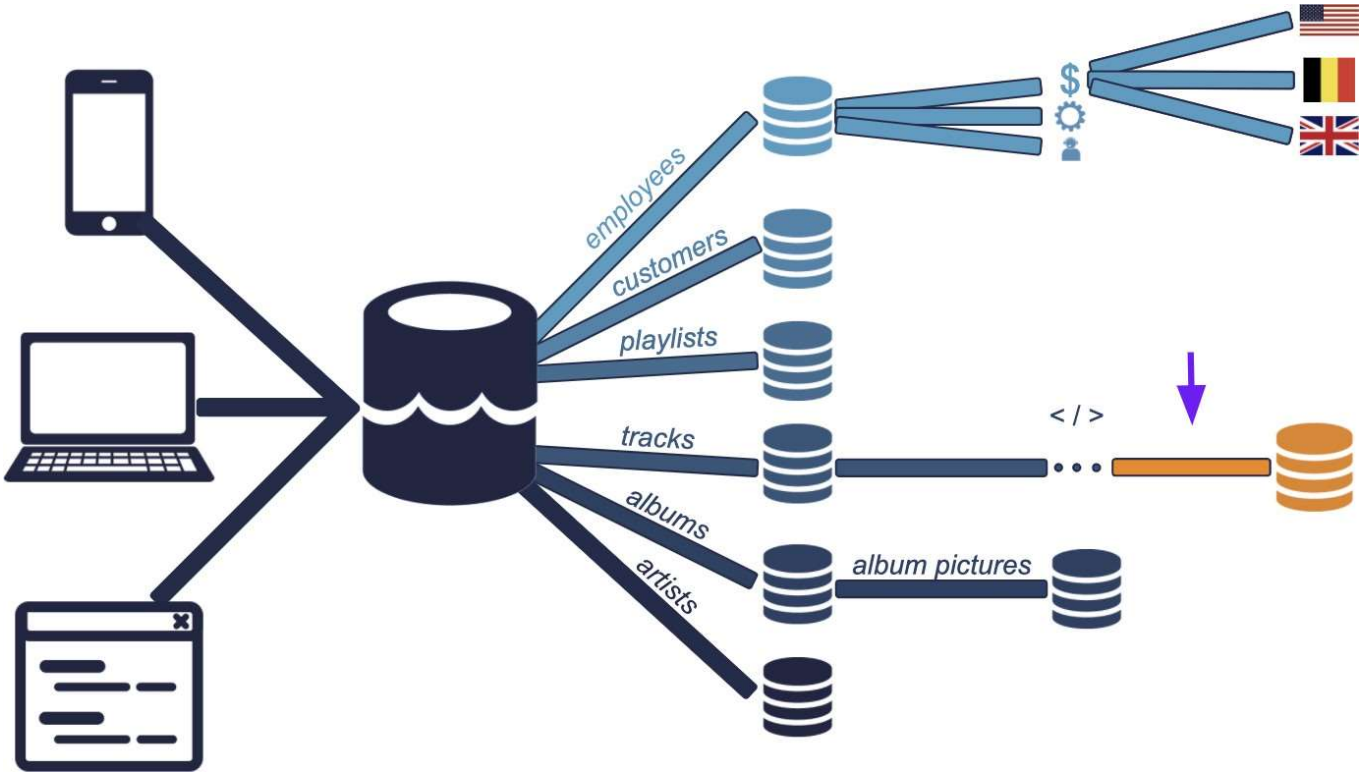
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2004
You get a pipeline !

2004
You get a pipeline !

2004
Everybody gets a pipeline !!!

Data pipelines ensure an efficient flow of the data

Automate

- Extracting
- Transforming
- Combining
- Validating
- Loading

Reduce

- Human intervention
- Errors
- Time it takes data to flow

ETL and data pipelines

ETL

- Popular framework for designing data pipelines
- **1) Extract** data
- **2) Transform** extracted data
- **3) Load** transformed data to another database

Data pipelines

- Move data from one system to another
- May follow ETL
- Data may not be transformed
- Data may be directly loaded in applications

Summary

- What a data pipeline is
- What it does
- Why it's important
- How data pipelines are implemented at Spotflix
- What ETL is and its nuances

Let's practice!

UNDERSTANDING DATA ENGINEERING