What is data engineering?

INTRODUCTION TO DATA ENGINEERING

Vincent Vankrunkelsven
Data Engineer @ DataCamp

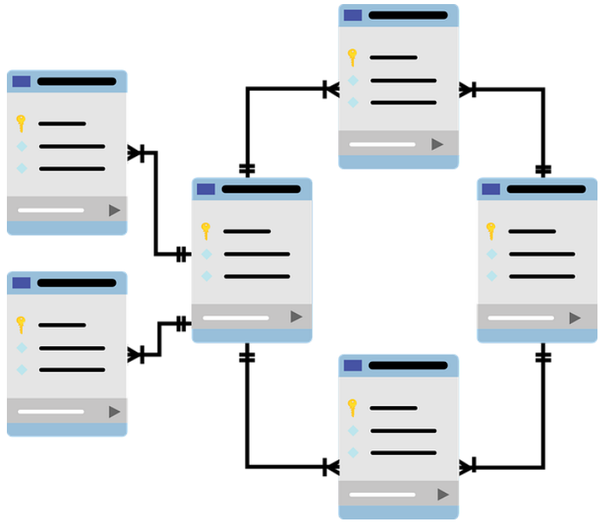
datacamp

What to expect

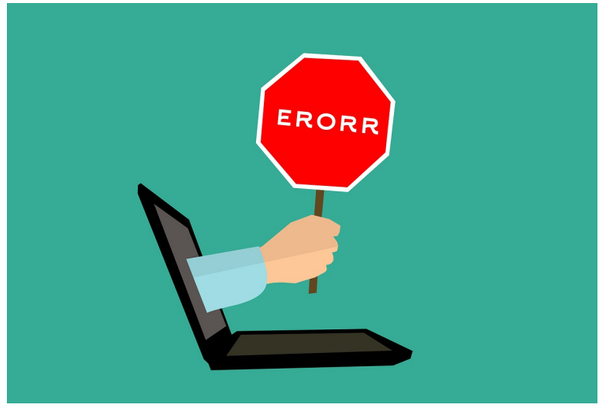
- Chapter 1
  - What is data engineering?
- Chapter 2
  - Tools data engineers use
- Chapter 3
  - Extract
  - Transform
  - Load
- Chapter 4
  - Data engineering at DataCamp!

In comes the data engineer

- Data is scattered
- Not optimized for analyses
- Legacy code is causing corrupt data



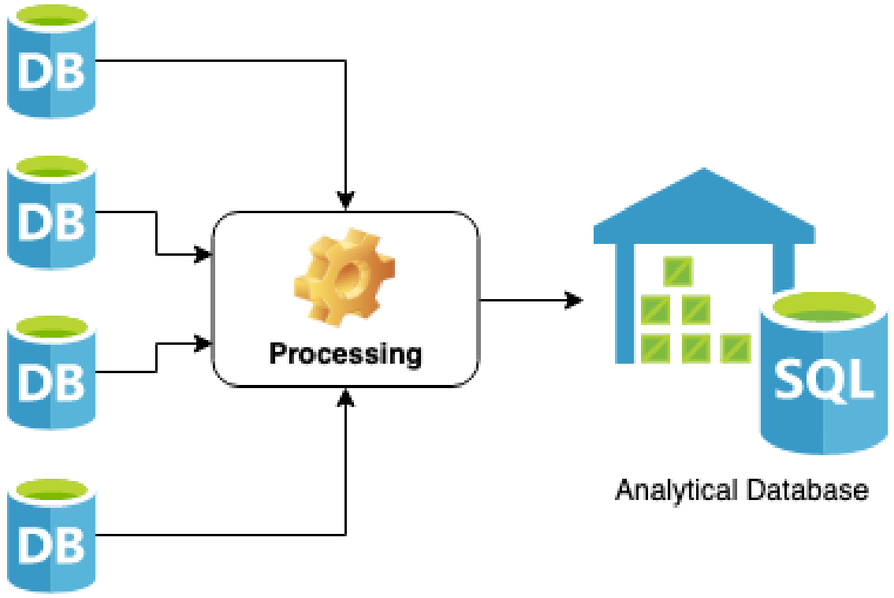
Data engineer to the rescue!



Data engineers: making your life easier

- Gather data from different sources
- Optimized database for analyses
- Removed corrupt data

Data scientist's life got way easier!



Definition of the job

> An engineer that develops, constructs, tests, and maintains architectures such as databases and large-scale processing systems

- Processing large amounts of data
- Use of clusters of machines

Data Engineer vs Data Scientist

Data Engineer

- Develop scalable data architecture
- Streamline data acquisition
- Set up processes to bring together data
- Clean corrupt data
- Well versed in cloud technology

Data Scientist

- Mining data for patterns
- Statistical modeling
- Predictive models using machine learning
- Monitor business processes
- Clean outliers in data

Let's practice!

INTRODUCTION TO DATA ENGINEERING

Tools of the data engineer

INTRODUCTION TO DATA ENGINEERING

Vincent Vankrunkelsven
Data Engineer @ DataCamp

Databases

- Hold large amounts of data
- Support application

- Other databases are used for analyses

Product
name
price
stock_amount

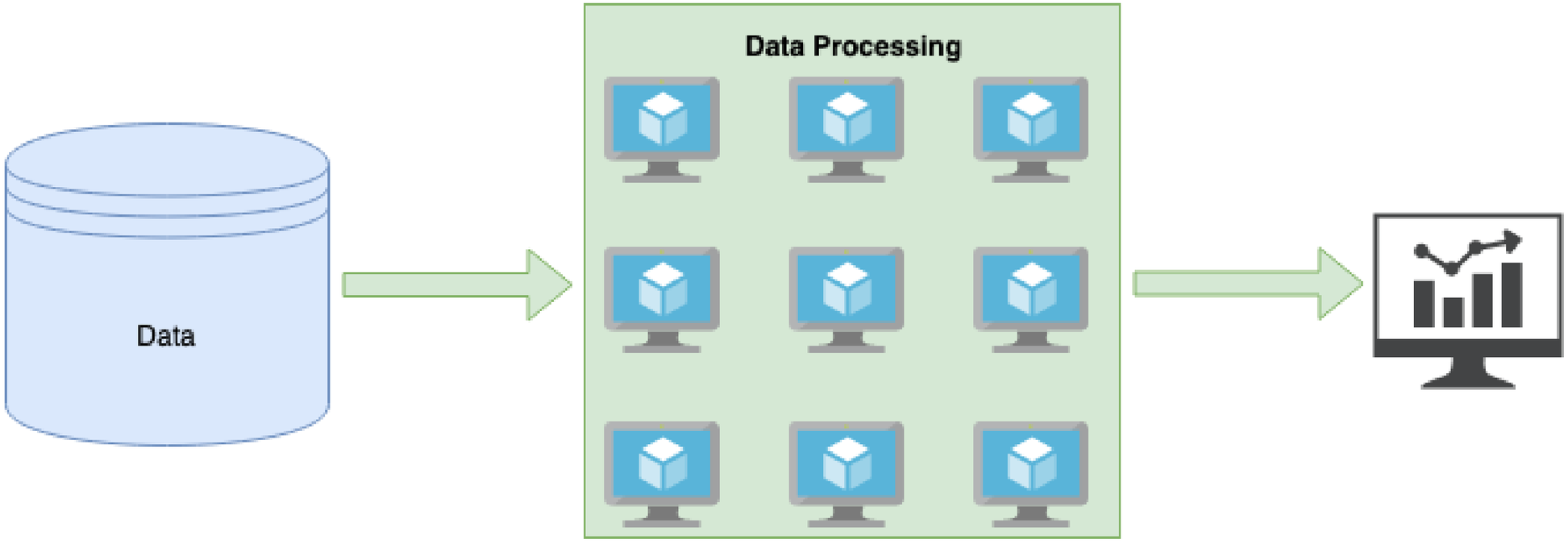
Processing

- Clean data
- Aggregate data
- Join data

Data processing is distributed over clusters of virtual machines.
This makes it very easy to scale.

If things are slowing down, assign some more virtual machines to the job.

Scale up the number of nodes when there's lots of data to be processed.



Processing: an example

```
df = spark.read.parquet("users.parquet")

outliers = df.filter(df["age"] > 100)

print(outliers.count())
```

Data engineer understands the abstractions.

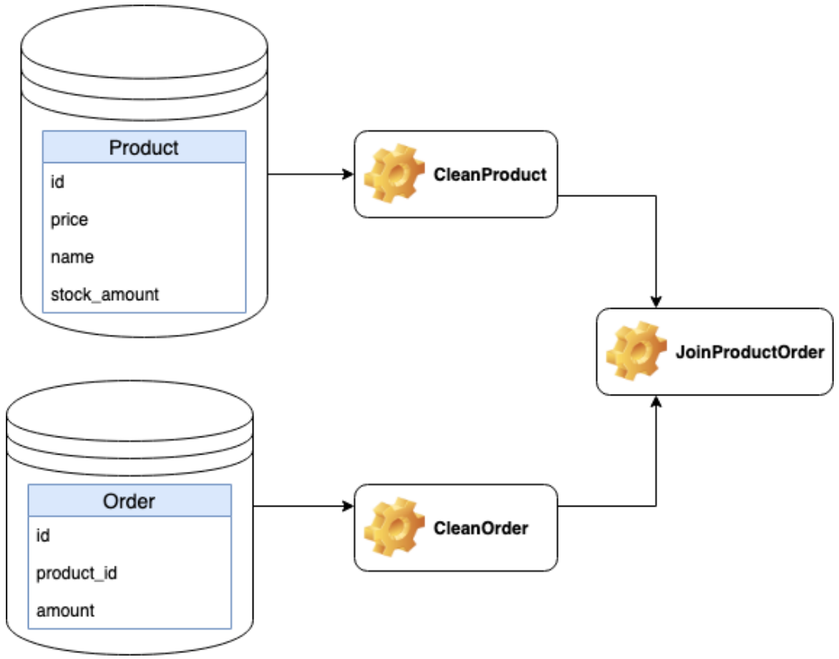
Scheduling

- Plan jobs with specific intervals
- Resolve dependency requirements of jobs

The last piece of the puzzle is the scheduler.
In this example, Apache Airflow is used.
You could see the scheduler as the glue of a data engineering system, holding each small piece together and organizing how they work together.

- Make sure jobs run in a specific order and all dependencies are resolved correctly.

- Make sure the jobs run at midnight UTC each day.



`JoinProductOrder` needs to run after `CleanProduct` and `CleanOrder`

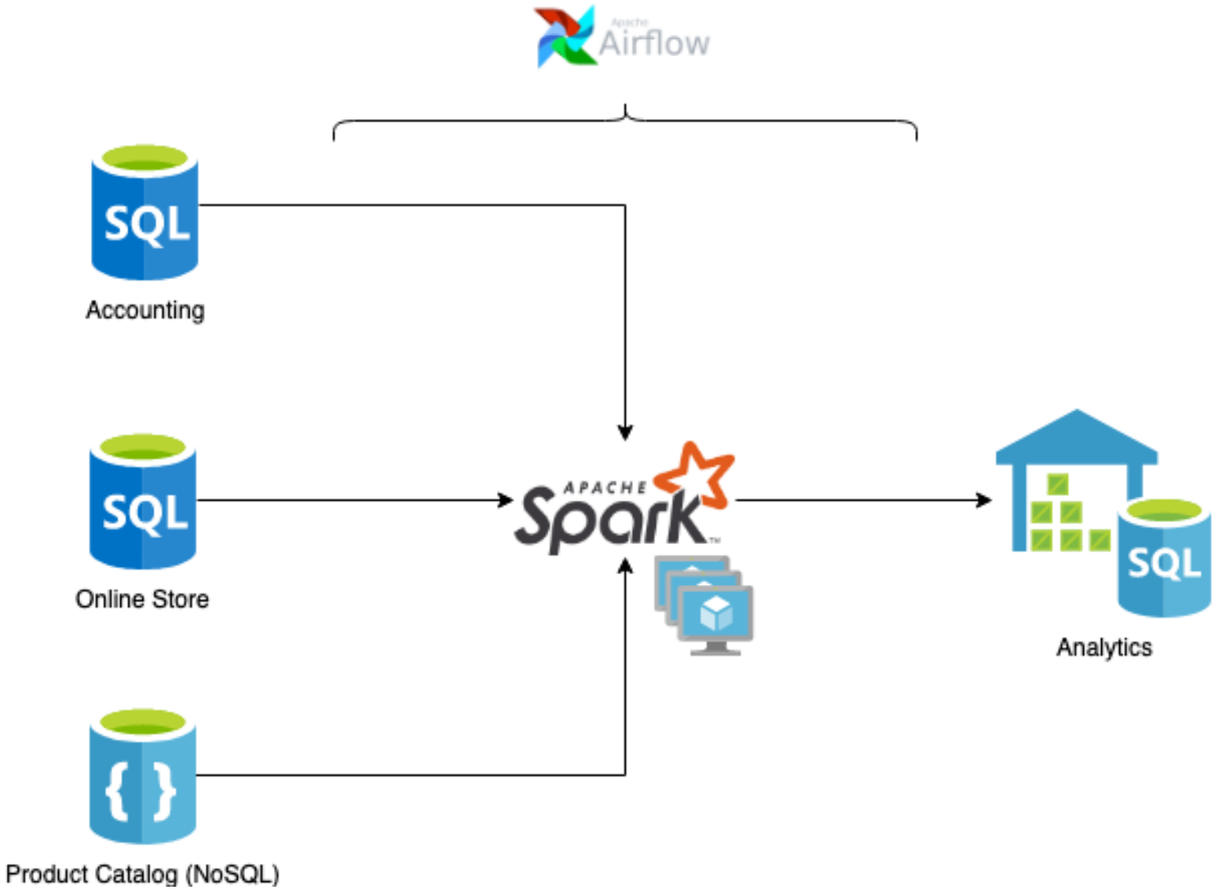
Existing tools

Databases

Scheduling

Processing

A data pipeline



Let's practice!

INTRODUCTION TO DATA ENGINEERING

Cloud providers

INTRODUCTION TO DATA ENGINEERING

Vincent Vankrunkelsven
Data Engineer @ DataCamp

Data processing in the cloud

Clusters of machines required

Problem: self-host data-center

- Cover electrical and maintenance costs
- Peaks vs. quiet moments: hard to optimize

Solution: use the cloud

The cloud can provide you with the resources you need, when you need them.
This property of cloud computing is also called cloud elasticity.

Data storage in the cloud

Reliability is required

Problem: self-host data-center

- Disaster will strike
- Need different geographical locations

Solution: use the cloud

The big three: AWS, Azure and Google

32% market share in 2018

17% market share in 2018

10% market share in 2018

- Storage
- Computation
- Databases.

Storage

Upload files, e.g. storing product images

Services

- AWS S3
- Azure Blob Storage
- Google Cloud Storage

Computation

Perform calculations, e.g. hosting a web server

Services

- AWS EC2
- Azure Virtual Machines
- Google Compute Engine

Databases

Hold structured information

Services

- AWS RDS
- Azure SQL Database
- Google Cloud SQL

Let's practice!

INTRODUCTION TO DATA ENGINEERING